In Two Sections—Section One

MECHANICAL ENGINEERING

INCLUDING THE ENGINEERING INDEX

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

Management's Duty to Science

Is it too much to hold up as one of the duties of Management and one of its privileges to turn aside for the support of Pure Science a fraction of the great stream of wealth which it is Management's function to transmute out of labor, management, and capital for the welfare of the community?

Joy in work and support of Pure Science are, in my conception, two of Management's most important possible contributions to prosperity in industry.

(From Management's Contribution to Prosperity in Industry, by Gano Dunn, pages 1285 to 1287 of this issue.)

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Crosby Field

J. P. Jordan

Robert Sibley

Gano Dunn

J. L. Cox

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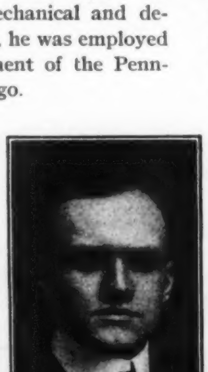
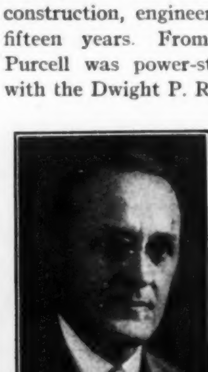
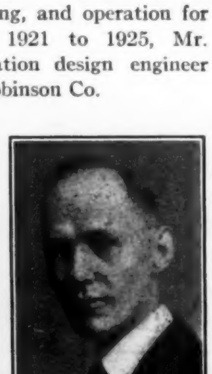


E. N. Fales



F. C. Spencer



K. W. Stinson

T. E. Purcell

MECHANICAL ENGINEERING

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Management's Contribution to Prosperity in Industry

By GANO DUNN,[1] NEW YORK, N. Y.

THE very title of my subject, Management's Contribution to Prosperity in Industry, starts with a challenge. Less than a generation ago the factors in industry were capital and labor, with a sharp distinction between them. The advent of the third party, Management, like a new kind of Second Estate, has been for the good of both the others, and cartoons are out of style that show the full dinner pail and the corpulent individual capitalist.

Distinctions have been removed, so that to a considerable extent we are all capitalists, and we shall egregiously fail if we do not make it equally true that we are all laborers. It was no insignificant boast by Walter S. Gifford, the president of one of our greatest industries, that "no person owns as much as one per cent of the stock of the American Telephone and Telegraph Company."

Old-fashioned "Capital" has learned with some surprise that if it gets poor paying high wages, it gets rich through increased consumption. That exceptional economist, Malcolm C. Rorty, has shown that over a period long enough to warrant an average, every man's annual income is annually spent. Doubters will ask, What about the money he saves and puts into the savings bank and into other forms of investment? But they should in turn be asked, What does the savings bank do with this money but lend it to home builders and to others who immediately spend it for labor and materials? While the owner doesn't spend it, it is nevertheless spent.

If it is true that the whole of everybody's income is promptly spent whether he himself spends it or saves it, it is easy to see why increased income and increased wages are not an economic loss to the community, but are the very opposite. They mean increased wealth through increased production.

The strong individual capitalist used to be the management also, and in the case of certain great and exceptional personalities who are leaders as well as capitalists, he is at the head of the management today; but, generally speaking, when the individual capitalist dissolved into the multiple, fractional capitalist and into the consumer-owner, his place as manager had to be filled. There arose then the functions which are the subject of this week's activities all over the land. These are under the auspices of Mr. Hoover and the Department of Commerce, which has created Management Week, at the suggestion and with the coöperation of The American Society of Mechanical Engineers and a number of engineering and management societies. Among these are The Taylor Society, organized to follow in the footsteps of the great and insufficiently recognized Frederick W. Taylor, The Society of Industrial Engineers, The American Management Association, The American Institute of Cost Accountants, The National Association of Purchasing Agents, The National Association of Foremen, The Life Office Management Association, and The National Association of Office Managers.

The three-party group, Labor, Management, Capital, as distinguished from the old two-party group, has seemed to tend toward the stabilization of industry in the solution of many of its problems.

[1] President, The J. G. White Engineering Corporation. Chairman National Research Council, Washington. Life Member A.S.M.E.

Address delivered at dinner session of the National Meeting of the A.S. M.E. Management Division, Chamber of Commerce, Rochester, N. Y., October 26, 1927.

Engineers are prone to think of management as in their hands. This is not wholly true, since there are large divisions of management that can hardly be called engineering—certainly not engineering in its original sense; but if engineering is ceasing to be engineering in its original sense and is becoming a way of thinking and going at problems that anybody with brains can learn, the way that Galileo taught us, it may not be far wrong to regard the whole of management as engineering.

The tendency to which I refer is illustrated by the enormous growth in the memberships and diversification of engineering societies, and the enormous expansion in the application of the term "engineer." One hundred and fifty years ago there was only one kind of engineer, the military engineer, but the Encyclopedia Brittanica says that about this time there arose a new class, the civil engineer. Today there are recognized over fifty different classes of engineer, and memberships in engineering societies are increasing almost in geometrical proportion. Some of these new classes deal with subjects such as "human engineering," which the earlier engineers would not recognize.

Management as we know it has the sympathy of labor and the confidence of capital. In a way it is half laborer, half capitalist, and has not so far to go to take the point of view of the laborer or the point of view of the capitalist, as either of these would have to go to take the point of view of the other.

The able papers before this regional convention of The American Society of Mechanical Engineers deal with wage incentives, production control, protection of quality, coördination of quality and quantity, handling equipment, economic lot sizes, plant location, and similar important items of what I shall call the tactics of management. I want to draw your attention to two transcendentally important features of the strategy of Management as distinguished from its tactics.

In this more fundamental realm of strategy I see as at once the privilege and the opportunity of management, two vastly important contributions to prosperity in industry: the one relating to immediate prosperity, meaning the prosperity of next month, next year, the next few years; the other relating to ultimate prosperity, meaning the prosperity of the next decade and beyond.

It is customary for the president of an industrial corporation, in addressing the annual meeting of his stockholders, to say "your company," "your officers," "your plants." Legally, the foundations of society rest upon the truth of this relation and the keeping of it true, but I hold that that president has failed who has not created in the management associated with him and in the labor which he directs, a sincere and genuine feeling that makes them call it "our company," "our officers," "our plants."

In the Russell Sage Foundation's report "Postponing Strikes," just published, giving the results of an investigation into the Canadian Industrial Disputes Act, I was startled to see that in the coal-mining industry in Canada, for the period beginning in 1907 and ending in 1924, 40.7 per cent of the wage-earning days of the miners each year were lost through strikes.

Everywhere the causes of strikes and labor dissatisfaction are too numerous and complicated to understand. If the laborer regards himself as a wage slave performing under compulsion tasks that are monotonous drudgery with a sense of underpayment and a sense of what he regards as injustice in the distribution of the proceeds

of the product, his activities will share the characteristics of the feet of the boy going to school instead of the boy let out.

The progress of education is beginning to give us schools to which boys like to go, and Management can give us industries in which men like to work. This is Management's greatest potential contribution to the prosperity of today, and it is a contribution which the industrial leadership of Rochester has signally begun to make.

Dr. Richard Cabot in his wonderful book "What Men Live By," which has gone through thirty editions—a startling fact for a book by a Harvard professor of the subjects of medicine and of ethics—tells of a critical meeting in Boston's historic Faneuil Hall, when Dennis Driscoll, president of Boston's Central Labor Union, assembled a big meeting of manual laborers to answer certain assertions and to protest against what the late President Charles W. Eliot had said about the joy of work. Although not present, I remember this meeting.

At the mere mention of joy in work, a spontaneous bitter laugh went all over the closely packed hall, which would not even listen to the suggestion.

These days were twenty years ago, when the old industry had not yet given place to the new, and when the full dinner pail was a slogan that was to embrace the *summum bonum* for labor. They were days when feeling was bitter, and they were before the industrial lessons of the Great War had been learned.

While the laborers jeered at the idea of joy in work, Dr. Cabot believes they did not jeer at the thing. Joy, he says, was too "high-falutin" a word for them to understand. Their class never used it. Many of those men, however were proud of their jobs and felt that their work won not only their own self-respect but the respect of others. They complained to their doctors when sickness had caused them to lose what they called their "ambition," and they showed all the signs that can never be crushed out of onward and upward struggling humanity that it loves the thing it has done, the thing that represents the satisfactory exercise of its own powers, the thing it has taken character and effort and sacrifice to create, the thing that whether he be artist, writer, or laborer, a man's mind and body both have labored to bring forth.

When work is drudgery, of course no man loves it, but when the workman is allowed to feel the joy of creation, he drinks deep at a refreshing spring.

Dr. Cabot instances a man carrying a canoe. In vacation time some of us have carried a canoe on our shoulders over a portage from one lake to another. After the first struggle of mounting, when we step out with security and pride in our legs and arms, the canoe seems unexpectedly light and we rejoice in deeper breaths and the power we find we possess. But the weight of the canoe increases after a few hundred feet and we have to draw on our resolution. In a few hundred more it is an irksome and intolerable burden, bruising our shoulders and requiring every effort that we can summon.

We may even think of putting it down, but we see ahead the upper lake, and though the load is drudgery and the pleasure of carrying has all gone, we hold on and follow through until the load is lowered at the goal.

How glad we are we didn't give up and how much has our self-respect increased along with the respect of our companions who have watched the struggle. With what joy do we paddle off afresh, remembering our fatigue only for the accomplishment it identifies.

I believe there is no job in industry that cannot be designed so that its day's work shall be like the vacation canoe.

The management that contrives to identify the product with the workman that produced it; to surround him with other than mere wage incentives; to introduce the principle of variety and some irregularity; to enforce responsibility and justify pride for quality; this management, especially if it provides safety devices, comforts, and facilities, and indicates a fraternal as distinguished from a paternal relation to the workman, will unleash forces effective for production and for good will that will astonish all calculation.

It will be bringing the workman up to the ideal of "making the thing as he sees it for the God of things as they are."

Some one has said, "We can never completely reform society, all we can do is to make it a little less vicious." So we can never take all the drudgery out of industrial labor, but we can go a long way toward putting joy in work, and the success that some of the leading industrialists have already accomplished in this direction gives us enthusiastic hope.

But what now of Management's contribution to ultimate as distinguished from immediate prosperity?

About the beginning of the last century, an English economist, Thomas R. Malthus, wrote his world-famous "Essay on the Principle of Population as It Affects the Future." So vigorous was his proof of the diminishing returns from land that the thinking world accepted as a fact the limitation of population by starvation. He argued that the extreme poverty and misery of England's poorer classes were an evidence that the principle was already applying itself, and Lord Macaulay, the historian and cabinet minister of England, accepted the Malthusian doctrine to an extent that led him to predict the overthrow of democratic forms of government through the people's fury with their leaders in the ultimate struggle for food.

Despite Malthus, never in the world's history has food been so plentiful as today. Whether the Malthusian doctrine has been only temporarily relegated to the background or whether its fundamental truth will some day have to be brought forward again for painful consideration, lies in the hands of Management.

Management can postpone and again postpone the advent of Malthusian conditions by the degree in which it supports and promotes science and discovery.

These are the factors which have removed starvation so far away from the workman of today that he never thinks about where his next meal is coming from, but rather his next radio or motor car. It is the unexpected intensive development of science and discovery that has brought to naught the prediction of so astute a statesman and historian as Lord Macaulay and removed the menace that was not only a menace to life but to democratic institutions.

But it is almost a waste of time to talk to this particular company about fostering science and discovery. I doubt if there is a manager of industry here who is not associated with large expenditures for industrial scientific research, and I know that some of these expenditures run into millions.

Twenty years ago, applied science had to be "sold" to capitalists. Today the millions of dollars spent in its support and the thousands of men engaged in its activities prove that it "sells" itself.

But there can be no applied science unless there be science to apply. The discovery of new scientific laws and new fundamental principles is not keeping pace with the application of those already known. As Elihu Root puts it, "We shall soon be threshing over old straw."

Several causes are responsible for this. Perhaps the principal one is the drawing off of original-minded thinkers from the fields of pure knowledge to the fields of industry to supply the acute industrial demand at good salaries for research workers in applied science.

Science that has no thought of a useful object is called "pure science," and pure science differs from applied science in being pursued solely for its own sake without regard to utility.

But there is a limit to what the worker in pure science can afford to pay for such disinterested pursuit, especially if he has to live and support a family. There must be created not only means for enabling the worker in pure science to live, but means that will attract into the field of pure science as a career, brilliant minds that now for material reasons cannot resist the appeal of the highly paid applied-science field.

The appeal for the support of pure science has always been difficult because in the past capitalists have been slow to see the remote but nevertheless infallible connection between pure and applied science. They have insisted upon demonstrations of utility and have refused their support to objectives that promised only new knowledge.

While no one can in advance assert the utility of researches in pure science any more than he can name which of a thousand insured men at the age of fifty will die next year, the certainty with which we know that fourteen of those men will die next year is the same kind of certainty that can be alleged of the utility of pure science.

If we should take away from the work of the world today those scientific discoveries, or even a few of them, that were made for pure love of knowledge with no useful end in view, the work of the world would stop.

Herbert Hoover says, and I think he is right, "Our whole banking community does not do the public service in a year that Faraday's discoveries do us daily." John J. Carty has calculated that magnetic induction, the discovery of which Faraday never sought as being useful, is the basis today of 30 billion dollars of taxation. Faraday was not in an industrial laboratory but in a pure-science research institution, the Royal Institution of London, founded by an American.

When Réaumur was studying the habits of wasps and the way they made their papery nests by grinding wood pulp with their mandibles and cementing it with their body juices, he was only an entomologist intent on new knowledge about insects, for its own sake. He was the kind of pure scientist sometimes humorously caricatured as boiling the watch while holding the egg in his hand. But Réaumur gave birth to the great wood-pulp paper industry.

Compared with the millions spent for applied-science research, the money spent for pure-science research is pitifully small.

Industrial leaders are now finding that applied-science research not only pays all of its own costs but yields handsome additional returns.

There are no commercial returns possible to the pure scientist. He is outside the protection of the patent laws which cover only inventions and not discoveries. His work is usually far in advance of the arts that use it and it is often apparently unrelated to them. Witness, long before ether waves were physically demonstrated, the mathematical proof of the existence of ether waves by Clerk Maxwell, and as a result of the work of this pure mathematician witness again the later physical demonstration of ether waves by Cornelius Hertz, who looked for them because of Maxwell's work. At that time which is still fresh in our memories, the wildest poetic imagination would not have dared to conceive the radio art.

Whether it be genius in a garret going hungry to buy instruments, or genius supported by philanthropic endowment to discover helium in the sun, or genius discovering the principle of relativity with an effect no one yet knows upon our arts, the fact that the genius has no means nor even desire to derive commercial support from his work, coupled with the fact that when that work is found to be valuable commercially, it is usually so enormously and vitally valuable, leads us thoughtfully to inquire:

Is it too much to hold up as one of the duties of Management and one of its privileges, and as an insurance for the future, to turn aside to the support of pure science, a fraction of the great stream of wealth which it is Management's function to transmute out of labor, management, and capital to the welfare of the community?

Joy in work and support of pure science are, in my conception, two of Management's most important possible contributions to prosperity in industry.

Engineering Research and the Engineering Foundation

SHORTLY after Ambrose Swasey suggested the creation of the Engineering Foundation in 1914, the World War broke upon the scene. Consequently all eyes were soon turned to national-security problems. In 1916 the newly-organized Engineering Foundation and the four Founder Societies joined with the National Academy of Sciences in establishing the National Research Council. From then until 1923 the Engineering Foundation devoted the greater part of its resources to the support of the Research Council and the Council's division of engineering. Since 1923, however, it has turned to the original intention for which it was created, of coöperating with the Founder Societies in projects affecting engineering at large, though it still retains a connection with the Research Council.

Some of these projects of the national societies in which the Foundation has coöperated include:

Research on concrete and reinforced-concrete arches
Research on steel columns for bridges and buildings
Research on mining methods
Research on properties of steam
Research on bearing metals
Research on lubrication
Research on strength of gear teeth.

These are all obviously important and much-needed researches. The projects in which the Foundation coöperated with the National Research Council are equally important. Some of these were:

Research on the construction and maintenance of highways (Advisory Board on Highway Research).

Research on Welding (American Bureau of Welding).

Research on injury to marine piling by the teredo and other small boring animals.

Research on molding sands for foundries (Committee on Molding Sands).

Research on pulverizing of ores, cements, and fuels (Pulverizing Committee).

Personnel research (Personnel Research Federation).

Mere enumeration and tabulation of work undertaken can of course lend but a vague idea of actual accomplishments. The reports of the Foundation give information of its widespread activities.

Typical of one of the extensive projects made possible by the Foundation was that called the Fatigue of Metals Investigation, in which it coöperated with the National Research Council, the University of Illinois, and several industrial corporations. Most of the experiments were carried on at the University of Illinois. For conducting this basic research the Foundation contributed $30,000 in cash, besides services. Contributions from other donors of cash, materials, and services brought the total up to more than $130,000. These comparative figures illustrate strikingly how willing other agencies are to help when an impartial institution like Engineering Foundation indorses a project.

This particular research was suggested by the failure of airplane-engine parts during the war. Valuable additions to our knowledge of what actually happens in the deterioration of wrought steels, cast steel, cast iron, brasses, bronzes, and other metals were made as a consequence of these extensive experiments covering several years. Some of the old theories about "crystallization of metal" were questioned and disproved. A summarized report called "Manual of Endurance of Metals Under Repeated Stress" gives the practical results; copies or other information may be obtained from the Director of Engineering Foundation, 29 West 39th Street, New York. The fundamental advantage of such a research for practically all branches of engineering is evident. Metals enter into nearly all engineering undertakings, and a knowledge of why they occasionally and disastrously fail is of great importance to all engineers.

As its funds grow, and opportunity permits, Engineering Foundation hopes to assist many other equally significant researches for the benefit of the profession and of the public at large.

P. B. M.

THE BUREAU OF STANDARDS has recently announced the development of an instrument known as the "earth current meter" which measures the corrosion of underground structures. The determination of this has been difficult and the results unsatisfactory because there has been no simple method of measuring the amount of stray current at the point where electrolysis is suspected. The instrument developed indicates directly the strength of the current in the earth at a given point and works upon the theory that the rate of corrosion is directly proportional to the strength of current flowing from a structure. Such an instrument would indicate directly whether the structure under test was in danger from electrolysis. The instrument is described in detail in Technical Paper No. 351, which also describes the various ways in which it may be used to determine electrolysis conditions.

The Modern Fire Engine

By KARL W. STINSON,[1] COLUMBUS, OHIO

This paper opens with a historical outline of the development of the fire engine, and passes then to the general requirements of the modern type and a brief description of the typical gasoline fire engine. The types of pumps are next considered, and the principal features of piston, rotary, and centrifugal pumps as applied to fire engines are described. The author closes with a comparison of gasoline and steam fire engines, and stresses the need for a standard specification for fire apparatus.

THE first fire engines of which we have any knowledge were built and operated by the Greeks and Romans about 150 B.C. These pumps were large syringes (Fig. 1), and each one required three men to operate it. This syringe type was followed closely by a double-piston pump mounted on wheels (Fig. 2). This pump was hand-operated, and even today, in many parts of the world, outlying districts have no other means of fire protection.

The first steam fire engine was built in 1830 but was never put in service. The first practical engine (Fig. 3) was built in 1852, and was self-propelled. This drive was not successful, and horses were used to pull it. This was followed by rapid development of the pump as well as of the boiler and engine. The small sizes were drawn by hand while the larger engines were horse-drawn. The boilers were fired with coal and were perfected to such a degree that a pressure of from 100 to 200 lb. per sq. in. could be developed in the boiler in from six to ten minutes from the time that the fire was started. The steam engine and the pump were usually

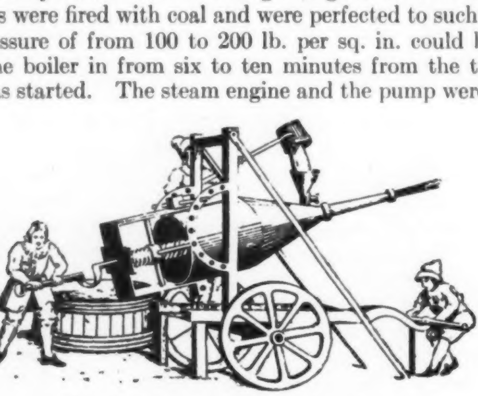

Fig. 1 Ancient Syringe Fire Pump

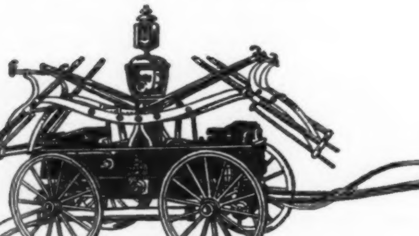

Fig. 2 Hand-Operated Fire Pump

of the opposed-piston type and were double-acting (Fig. 4). Some of these engines were equipped with flywheels. A small percentage of the steam fire engines had rotary pumps which were driven by rotary steam engines.

Many attempts were made to propel the steam fire engine by its own power. This type of drive was not very successful due to a somewhat crude method of operation and also to the fact that, unless steam was kept in the boiler at all times, the engine could not start for the fire for perhaps five minutes after the alarm was received. More than twenty years ago steam fire engines were drawn by gasoline-engine tractors, many of which were mounted on only two wheels, the unit replacing the front wheels of the fire engine. The power was transmitted through the front wheels, and brakes were mounted on these as well as on the rear wheels. The brakes, however, were not applied on all wheels at one time. This arrangement of brakes caused many serious accidents on account of faulty operation.

Along with the conversion of the steam fire engine into a self-propelled vehicle came the first of the gasoline fire engines. Several manufacturers were attempting to build fire engines with a

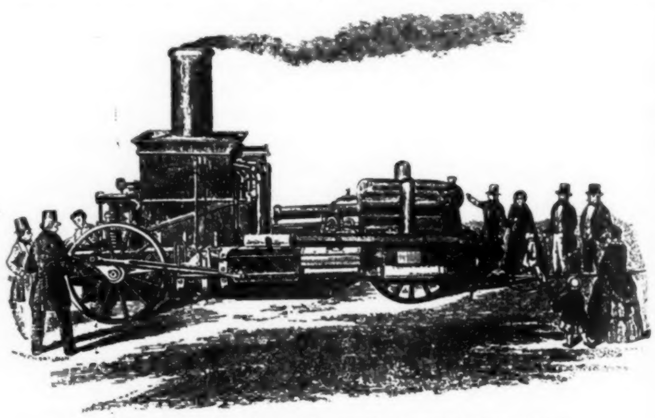

Fig. 3 World's First Practical Steam Fire Engine

Fig. 4 Steam Fire Engine

gasoline engine to operate the pump as well as propel the apparatus on the road. The absence of dependable gasoline engines twenty years ago caused the gasoline fire engine to be considered unfavorably in comparison with the steam-driven fire engine. However, the development of alloy steels and the great advance made in automotive design raised the standing of this new type of fire engine, until today it has replaced practically all steam fire engines.

The rise of the gasoline fire engine has been a very noteworthy engineering achievement as the problems encountered were, in many cases, much different from those of the automobile industry, although they might appear at first to be practically the same. The one point that is foremost in fire-engine design is dependability—strength at any cost. Engine proportions that were very satisfactory for the automobile were not suitable for such service. The bearings were too small, the crankshaft was not strong enough, and many other parts would not stand up under the severe conditions of operation encountered in fire service. One of the causes of these variations in engine proportions is the fact that the automobile engine is operated most of the time at from one-quarter to one-half of full throttle opening, while in the case of the fire engine the throttle is wide open much of the time. This condition of operation necessitates many differences in design and manufacture of fire engines from those employed in the manufacture of automobile and truck engines. It has been necessary for the manufacturers of gasoline-operated fire engines to carry on much research and development work in order to overcome the troubles encountered when operating under such extreme conditions. The result has been dependable fire engines.

[1] Assistant Professor of Automotive Engineering, The Ohio State University. Mem. A.S.M.E.

For presentation at the Annual Meeting, New York, December 5 to 8, 1927, of The American Society of Mechanical Engineers. All papers are subject to revision.

Approximately these same conditions were being encountered at this time in the development of the airplane engine, but the airplane engine differed from the fire engine in that weight was one of the primary points to be considered. Also, the airplane engine was mounted on fairly flexible supports, while the fire engine was more rigidly supported.

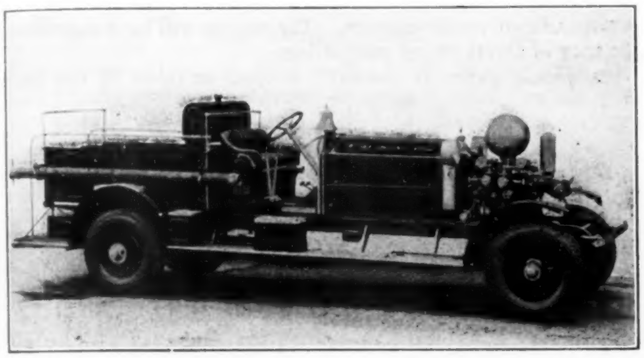

FIG. 5 AHRENS-FOX PISTON FIRE PUMP

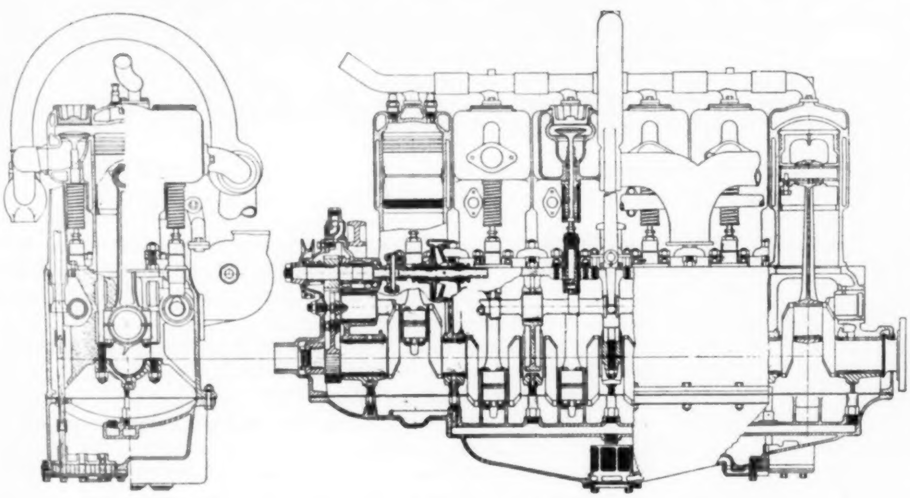

FIG. 6 SECTIONAL VIEWS OF SEAGRAVE $5^3/_4$-IN. × $6^1/_2$-IN. ENGINE

Modern Fire Engines

The fire engines of today (Fig. 5) vary in size from about 400 to 1500 gal. per min. when pumping at a pressure of 120 lb. per sq. in. Some smaller pumps will be found mounted on various truck chassis. The fire engines require gasoline engines capable of delivering from 70 hp. for the smallest size to about 200 hp. for the largest. In other words, if six-cylinder engines are considered, this means that the engines will range from about $3^3/_4$ in. bore and 5 in. stroke to perhaps $6^3/_4$ in. bore and 8 in. stroke. The maximum operating engine speeds will vary from 2000 to 900 r.p.m. These engines are practically all larger than those commonly used in automobiles and trucks.

A fire engine is rated at a certain capacity when pumping at a pressure of 120 lb. per sq. in., but it must be capable of delivering one-half this volume at 200 lb. per sq. in. and one-third at 250 lb. per sq. in. Pressures of 400 lb. per sq. in. and over are required of the pumps purchased by some cities. One piston pump recently delivered was operated at over 500 lb. per sq. in. Centrifugal pumps have also been developed for these high pressures in fire service.

The National Board of Fire Underwriters, which controls the fire-insurance rates, requires that before a certain make or model of fire engine will be recognized, one fire engine of each model must successfully pass an endurance test of twelve hours under observation of Underwriters officials. The pump is operated for a period of six hours at its full rated capacity at a pressure of 120 lb. per sq. in., three hours at one-half capacity and 200 lb. per sq. in. pressure, and a final three hours at one-third of its rated capacity and a pressure of 250 lb. per sq. in. Besides this test, which is required but once for each model, each fire engine must undergo a three-hour acceptance test similar to the former test, except that the time required at each pressure is less than that in the official rating test. The fire engine must undergo these tests at approximately wide-open throttle without a serious fault, and be capable of doing that much and more in actual service. It is not an uncommon experience for fire engines to be required to operate continuously for days at a time.

Gasoline Engines

At the present time, engines that have been developed for the bus and rail-car industries are being adapted to fire service. In order that this might be done, many changes in the details of manufacture were necessary.

The heavy-duty fire engines of from 750 to 1300 gal. per min. require engines capable of delivering from 100 to 200 b.hp. (Fig. 6). Since very few suitable engines were being built at the time that this demand developed, each pioneer built his own engines. The engines used today by most manufacturers are in many ways very similar. They all use six-cylinder engines with deep-section Lynite crankcases (Fig. 7). Tee-head cylinders are used on most engines. This style of cylinder head is doubtless retained due to the limited production which does not warrant radical changes in design, and to the large valve openings that can be obtained. These engines are all equipped with both battery and magneto ignition. The magneto is either single- or two-spark. The battery ignition is supplied as a safety measure and is not synchronized with the magneto ignition.

Some of the exhaust gases are passed through a jacket around part of the intake manifold. There is a butterfly valve in the exhaust manifold which is connected to the throttle valve in such a way as to cause all of the exhaust gases to pass through the jacket around the intake manifold when the throttle is closed, but when the throttle is wide open the exhaust valve is open so that most of the gases will pass out through the exhaust pipe.

A combined low-pressure and splash system of lubrication is used. The oil is forced to the main bearings and is splashed from troughs under the connecting-rod bearings to the other bearings. A stream of oil is supplied to the timing gears.

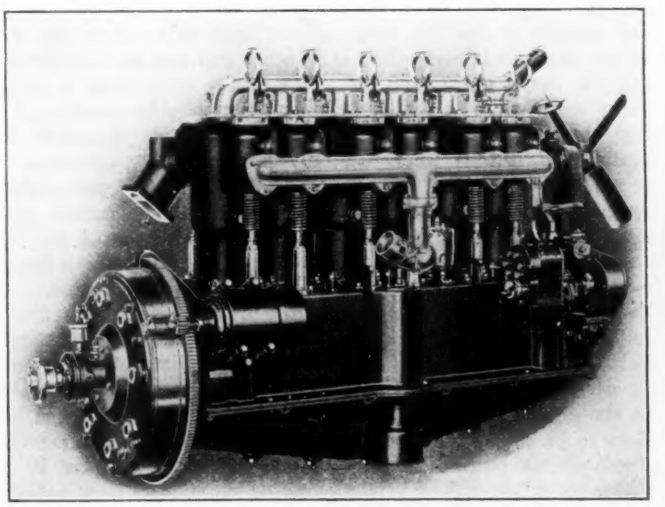

FIG. 7 INTAKE SIDE OF AHRENS-FOX $5^7/_8$-IN. × 7-IN. ENGINE

The cylinders are cast either separately or in pairs. It follows that engines of the former type have seven-bearing crankshafts while the latter have four-bearing crankshafts. One make has

one intake valve and two exhaust valves in place of the conventional construction employed by the others.

In one engine the maximum bearing pressure on the connecting-rod bearings is 870 lb. per sq. in., while that on the main bearings is 730 lb. per sq. in. when the engine is operating at 1600 r.p.m. with wide-open throttle.

The cooling system on all engines incorporates the conventional centrifugal circulating pump. However, when pumping, this system alone is very inadequate. Water from the fire pump may be fed into the cooling system and allowed to overflow from the radiator. Some manufacturers provide auxiliary coolers. These coolers consist of a series of brass tubes, around which some of the water pumped by the fire pump circulates while the water from the cooling system is circulated through the tubes. A small water line from the fire pump is also provided so that the water supply in the cooling system may be easily replenished.

Positive-Displacement Pumps

The steam fire engine brought the positive-displacement pumps into great favor with the fire fighters all over the world. Both piston and rotary-gear pumps were used, although the piston pump was the more common. Over 75 per cent of the pumps in use on fire apparatus in the United States are of the positive-displacement type, approximately 90 per cent of these being rotary while the remainder are piston pumps.

Both piston and rotary-gear pumps displace the water at varying rates during the cycle of pump operation. This action tends to cause very marked pulsations at the pump discharge. In order to smooth out these pulsations, all piston pumps and most rotary-gear pumps have large air chambers. If these air chambers are of sufficient size and do not lose the air, the pulsations will not affect the quality of the fire stream or lessen the life of the hose. This unevenness of flow causes considerable vibration in the fire engine in many cases.

This type of pump is very desirable when drafting from a body of water or from a cistern, as the pump can prime itself. The rotary pump, however, after being used for some time (the amount of time depending upon the condition of the water pumped) is not capable of drafting water at very high lifts due to the wear of the gears or lobes against each other and also against the casing. It is not uncommon for rotary pumps after years of service to be worn so as to render priming practically impossible. This may be partially remedied in some makes by adjustable side plates, but serious wear can only be completely overcome by rebuilding the pump. The priming qualities of the piston pump are not affected by wear to any extent, but a stone or cinder under a valve or a faulty valve may make priming impossible at high lifts. It is practically impossible to prime any pump at high lifts if there is a slight air leak, such as might occur at a packing gland. At least 95 per cent of the pumping done by fire engines is from hydrants, but all engines should be capable of drafting water when necessary.

Each fire engine may deliver water to four lines of hose or less. It is common practice for the hose lines to have shut-off valves at the nozzles, thus making it possible for any or all of the hose lines to be shut off by the men at the nozzles. With a positive-displacement pump this would mean that the pressure in the pump would be raised. When one or more hose lines are shut off suddenly the increase in pressure might be very dangerous for the firemen using the remaining hose lines. Automatic relief valves are provided to operate at a definite pressure and also a churn valve which may be opened to further relieve the pressure without shutting down the pump.

Piston Pumps

When the gasoline fire engine was first conceived, it was quite natural for some manufacturers to believe that the piston pump was the most suitable type. This pump has been so well adapted to the modern fire engine that it is favored by many today. The piston fire pump is connected to the engine through a reduction gear (Fig. 8). The pumps have either four or six double-acting cylinders, all or half of which may be operated at one time, depending upon the water pressure desired. The whole pump is used for low pressures while only one-half is used for high pressures and correspondingly small volumes. The pumps will have a maximum efficiency of about 85 per cent or less.

The piston pump is generally located in front of the engine and is connected to the engine by means of a jaw clutch when the pump is to be operated. Some piston pumps are located under the driver's seat and are driven from the drive shaft which leads to the transmission.

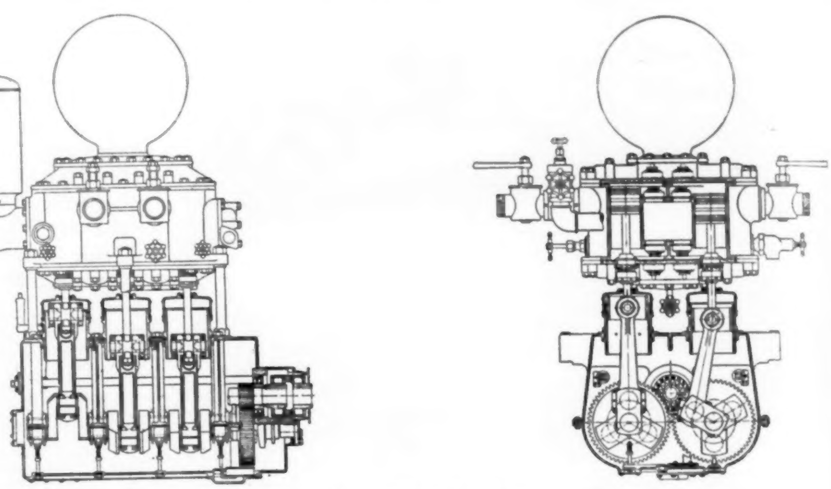

Fig. 8 Sectional Views of Ahrens-Fox Six-Cylinder Piston Pump

The cylinders in the pumps manufactured by one company are of $4^1/_2$ in. bore and 6 in. stroke. The upper section of the pump is a large bronze casting which contains all of the pump cylinders, the suction passages, the suction valves, and part of the discharge passages. The cylinder heads contain the discharge valves. The valves are of hard rubber and seat on bronze. Each pump piston has two leather cup packings placed back to back. The cylinder assembly is supported above the crankcase on a series of long studs. Two crankshafts, side by side, are mounted in the crankcase parallel to the engine crankshaft. A large spur gear is mounted on the rear end of each crankshaft but is free to turn on it except when connected to the crankshaft through a two-jaw clutch which engages in only one position, and drives the pump at about one-third engine speed. These spur gears are in mesh with a pinion which is directly connected to the engine crankshaft through a double universal joint.

Two control handles are located on top of the front end of the pump crankcase. Each handle controls one side of the pump. The engine is slowed down to an idling speed when the pump clutches are to be engaged.

Discharge valves to control the fire streams are mounted directly on the pump casing. Each discharge valve has a bleeder valve attached to permit draining the fire hose. A churn valve and an automatic relief valve are also provided.

Rotary Pumps

The rotary pumps used in fire engines have rotors which either resemble large-toothed gears (Fig. 9) or are somewhat irregular in shape. The pump used in one make of fire engine has gears of about one or less diametral pitch and with six or more teeth each. One of these gears is keyed to the shaft leading to the pump transmission, receives the power from the engine, and in turn drives the other gear. The pumps which have irregularly shaped rotors with sealing strips are driven by a pair of gears located outside of the water compartment. The maximum efficiency of rotary pumps varies from 70 to 80 per cent with the various makes.

A pump transmission is fastened to the top of the road-transmission case (Fig. 10). An extra gear in the road transmission

permits the power to be taken off here for the fire pump. Speed-change gears are provided in the pump transmission so that the pump may be operated at a high speed for a large volume of water and may be slowed down for high pressures. At least two or three speed ratios are available. The operation of the pump is controlled by a gear-shift lever which also releases the clutch while shifting gears.

Centrifugal Pumps

The centrifugal pump delivers the water by imparting to it velocity energy which is changed to pressure energy as the water passes through the pump casing. When a pump of this type produces this change of energy correctly, the flow of water will be free from pulsation. Centrifugal pumps used in fire engines are multi-stage and have from two to four impellers (Fig. 11). Turbine pumps with diffusion vanes are generally used in place of the volute casing. The gear ratio between the pump and the engine is fixed for all deliveries and pressures. The variation of pressure is accomplished by only varying the quantity of water discharged. An increase in pump pressure is accompanied by a slight increase in pump and engine speeds. Even though the discharge valves are completely closed, the pump would develop a certain pressure dependent upon its speed, but would not require any relief valves such as are necessary on positive-displacement pumps.

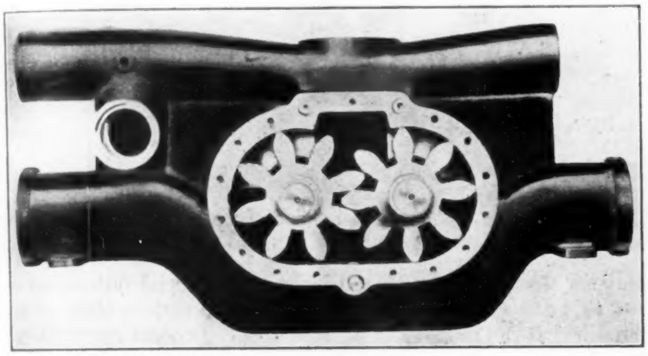

Fig. 9 American-LaFrance Rotary-Gear Pump

When water must be pumped from a stream or other source the centrifugal pump cannot deliver water until it has first been primed. A small positive-displacement pump is generally used as a priming pump to overcome this difficulty. This pump adds somewhat to the complication of the pump assembly, but it has the advantage of providing a priming device that is in operation only when the pump is to be primed.

The fire pump as manufactured by one company is made up of a large barrel-shaped body that encloses the rotating parts which consist of the impellers and the shaft. The body contains all of the water passages from one impeller to the next, as well as two suction and two discharge passages. The pump shaft is supported on two ball bearings; one is a deep-groove type while the other is a double-row combined radial and thrust type. This arrangement takes care of any unbalanced end thrust in the pump.

A gear on the pump shaft is in mesh with a gear that may be connected to the main driveshaft when the pump is to be operated. These pump-transmission gears are 4-diametral pitch, $14^1/_2$-deg. involute with $2^1/_2$-in. face. They are ground after heat treatment to lessen the noise of operation, as they sometimes have pitch-line speeds of over 4000 ft. per min. The gears are free when the apparatus is on the road, and are connected to the drive shaft by a special three-jaw clutch.

On the front of the pump transmission is the priming pump. This is an eccentric-vane type of positive-displacement pump, and is capable of priming the fire pump at lifts of over 25 ft. in less than a minute. The priming pump is connected, when needed, to the end of the centrifugal-pump shaft by a second jaw clutch. In England small piston priming pumps are used, while in this country one company is using a Nash "Hytor" vacuum pump. The pump and transmission are mounted under the driver's seat. This assembly and the engine exhaust pipe are enclosed by sheet-metal walls in order to prevent freezing in the winter.

The pump is controlled by means of a lever on the side of the apparatus. When this lever is raised, the main clutch is released. With the clutch out, the lever may be pushed sideways to engage the jaw clutch that drives the pump transmission. If the pump is to draft water, the priming pump must be used, and it is controlled by a latch on the control lever. The latch is held down until water has been obtained, when it is released so that the priming pump may stop. There are other levers for controlling the fire streams, auxiliary cooler, and pressure regulator.

A pressure regulator or governor is provided to control the speed of the engine by means of the pump pressure. The water pressure at the pump discharge operates an auxiliary throttle valve above the carburetor. By this means, if some or all of the nozzles on the lines of fire hose are shut off, the engine will slow down so as to maintain a constant water pressure.

Centrifugal fire pumps are made as small as possible due to the limited space available for installation, but even then the pumps have maximum efficiencies of about 75 per cent. A centrifugal pump is designed to operate at some certain pressure, but for a fire engine where the pressure may vary from 120 to 400 lb. per sq. in., this design pressure is very difficult to determine and is based in a great part on experience. Another very important item in centrifugal-pump fire-engine construction is the determination of the proper gear ratio between the pump and engine. This ratio must correlate the variations in engine torque and pump efficiency so that the maximum volume of water may be obtained at the various pressures.

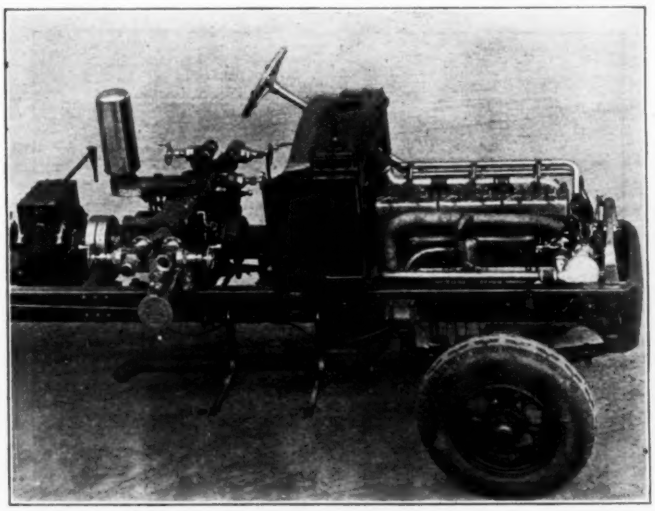

Fig. 10 Mack-Hale Rotary Fire Pump and Drive

One manufacturer is applying the parallel-series operation of centrifugal pumps to fire engines. Two shafts carrying two impellers each are mounted side by side in a common pump case (Fig. 12). The two halves of the pump are operated in parallel at low pressures, but when pumping at high pressures the halves are operated in series. In this manner the pump is operated nearer its maximum efficiency through a wide range of pressures. This also makes it possible for the engine to operate at approximately the same speed for low pressures as for high pressures. With this arrangement the engine may be operated near the peak of its horsepower curve at all times and thereby permit the use of a smaller engine to deliver a given volume of water.

Chemical and Water Tanks

Many fire engines carry a chemical tank of from 35 to 60 gal. capacity and 200 ft. of 1-in. chemical hose for small fires. A solution of bicarbonate of soda and water is carried in these tanks, together with a closed bottle of sulphuric acid. When the fire is reached, the acid is dumped into the soda solution. A very high pressure is developed in the tank and is used to force the solution through the hose to the fire.

Due to the great amount of damage caused by this chemical solution, there is a rapidly growing tendency toward the use of water tanks of from 65 to 80 gal. capacity in place of the chemical

tank. This water is pumped through the regular chemical hose. This method has been found to be very effective on small fires that have not gained much headway.

Fire engines are capable of road speeds of more than 55 miles per hour, even though the weight without men or fire hose is perhaps 10,000 lb. or more. From 1000 to 1500 ft. of $2^1/_2$-in. fire hose is carried in the hose body at the rear of the truck.

Gasoline vs. Steam

When the fire engine carries a chemical tank or a water tank, it is taking the place of the steamer, the hose wagon, and the chemical engine. One operator is required to drive the gasoline fire engine and to operate the pump when at the fire, while with the old-style steamer at least two drivers and one operator were required, besides from five to seven horses.

The first cost of the gasoline fire engine is slightly more than that of the steamer and hose wagon with horses when allowance is made for variations in money value. The maintenance-cost proportion of fire apparatus for cities in various sections of the country varied from two to one to six to one in favor of the modern fire engine. A large part of this variation was due to different accounting methods used.

Besides this, the gasoline fire engine serves at least twice the area that was covered by one steam-engine company, and is capable of answering many more alarms per day than the horse-drawn

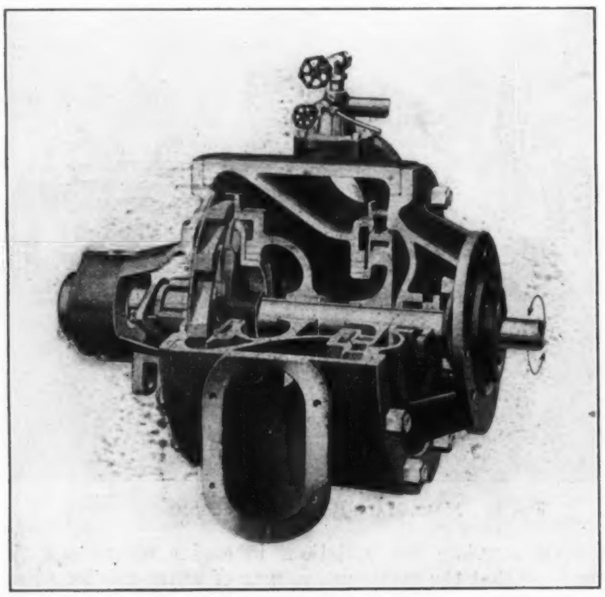

Fig. 11 Seagrave Two-Stage Centrifugal Pump

engine as the gasoline engine is not dependent upon physical endurance.

The steamers were built in various capacities from 300 to 1300 gal. per min., and today we find the gasoline fire engines in approximately the same sizes.

The efficient life of the steamer and the modern fire engine is stated by various fire chiefs to be from fifteen to thirty years, depending upon the service and care which they receive. The life of the modern fire engine is thought by nearly all to be the equal of the steamer; however, some chiefs who use one type of pump claim that the modern fire engine has served its economical usefulness after from five to fifteen years.

Manufacturing and Sales Conditions

The engineering problem in fire-engine manufacture is greater than would be expected, due to the number of models of apparatus produced. For instance, one manufacturer builds seven sizes of fire engines which require four sizes of engines. Along with this there are about ten models of combination cars, service (ladder) trucks, aerials, and water towers. This makes a total of seventeen models, many of them coming through the shop at one time.

Besides this, practically all cities have many special features which they insist must be incorporated in their machines, such as special bodies and equipment. If fact, anything except the engine, pump, transmission, and axles is subject to the requirements of the various cities. Quantity-production methods are applied in a small way to the manufacture of the standard units, but with much difficulty, as the great volume of special work tends to disrupt such routine. Individual shop specifications are required for most fire engines built.

With the present-day tendency toward standardization it is

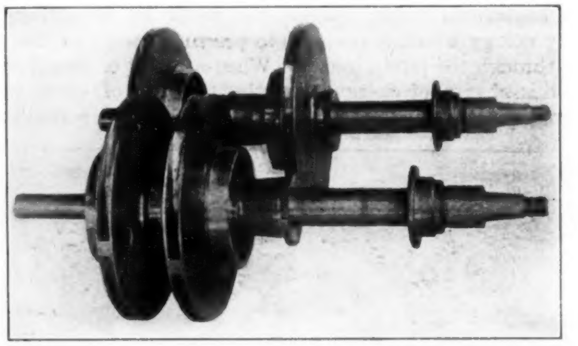

Fig. 12 Impeller Arrangement in New Mack Parallel-Series Centrifugal Pump

surprising that the cities should insist upon special fire-engines—insist that the manufacturer build to suit the various cities—with the result that the people pay at least twenty per cent more. Why should not the manufacturers discontinue building special fire apparatus? They should, but the initiative must be taken by the cities.

Before any standardization can be hoped for, the methods used for the selection and purchase of fire apparatus must be put in the hands of competent men. Most cities have a committee to purchase the apparatus who have no knowledge of the relative merits of the various types but simply buy from a specification which in many cases has been prepared without consideration of the engineering principles involved. In other words, the politician and not the engineer is the person who decides what will best protect our homes and buildings from fire.

The National Board of Fire Underwriters are preparing a specification for fire apparatus which, it is to be hoped, will serve as a step toward a standard specification that will be acceptable to both the manufacturers and to the engineering representatives of the cities.

Great development has been made in fire apparatus in the last few years, but like most other industries, much improvement is still needed. This fact is realized when one considers that the annual fire loss in the United States amounts to over $500,000,000, and that more than 15,000 people lose their lives in fires each year. It is to be hoped that these figures may decrease in future years with the aid of improved fire-fighting methods and more effective fire engines.

Rubber Vulcanizing Processes

The United States Bureau of Standards has announced a study of the properties imparted to rubber by vulcanizing it with varying proportions of sulphur. The statement points out that the vulcanizing process is in reality the basis of the rubber industry but that the theory underlying the process is still obscure.

This process is said to produce definite chemical compounds which give to vulcanized rubber its valuable properties. The vulcanization process consists in mixing sulphur with rubber and heating the mixture until a chemical reaction takes place. Few materials could apparently differ more in their properties than the rubber band and a hard rubber radio panel, yet they are both made from the same rubber and sulphur; one containing three to five per cent of sulphur and the other twenty-five to thirty-two per cent.

Although this vulcanization process is the basis for the whole rubber industry, the theory underlying it is said to be very obscure, so that there are many everyday problems in rubber technology which will not be solved until more is known of the fundamental theory of vulcanization. It is this theory that the Bureau of Standards proposes to delve further into.

Engineering Research on the Pacific Coast

Research Facilities in the Universities of the Pacific Coast—Problems Under Investigation by Western Universities and Industries—Research Problems Deemed Especially Urgent

By ROBERT SIBLEY,[1] BERKELEY, CALIF.

THE eleven states west of the Rocky Mountains, containing as they do some sixty-five per cent of all the water power in the United States, although at present possessing only 8 to 10 per cent of the population, offer an opportunity for future control of the forces of nature through research study perhaps not equaled elsewhere in the world. One example is sufficient to cite—the Colorado River. Here we have a possible ultimate development of some six million horsepower and an additional possibility of reclaiming by irrigation from four to five million acres of arid lands which will involve the building of dams far exceeding in height any similar structures in the world today, coupled with the transmission of power in quantities and over distances hitherto not attempted. Then, too, the northwestern states in their timber problems and California in the development of petroleum and its products have added to the urgent call for much additional research.

Early this year the Chairman of the Main Research Committee of The American Society of Mechanical Engineers requested a survey of the Pacific Coast universities and industrial organizations to secure information (1) as to the number and location of research laboratories, both public and private; (2) a list of the investigations that are at present being conducted in those laboratories; (3) a list of engineering problems that Pacific Coast industries would like to recommend to our Society as part of its research program; and (4) a list of the names and business connections of men, firms, and colleges interested in those problems.

In compliance with this request there were sent out some thirty letters of inquiry covering the above-mentioned points.

There follows a résumé of these replies, together with a few very general conclusions which it is hoped will stimulate in the mind a picture of the urgent need of more funds in the West wherewith to successfully prosecute the important studies herein suggested.

Research Facilities in Pacific Coast Universities

The more important facilities available for research in the universities on the Pacific Coast are given below. Of course many minor pieces of apparatus and facilities have not been mentioned but which could be used in rounding out any particular program.

In the matter of electrical research, the University of Idaho is equipped only for undergraduate instructional work and has been enabled to carry on but little original work. For mechanical problems it has a steam and gas laboratory, and in civil engineering a materials-testing laboratory in which highway testing and research are carried on.

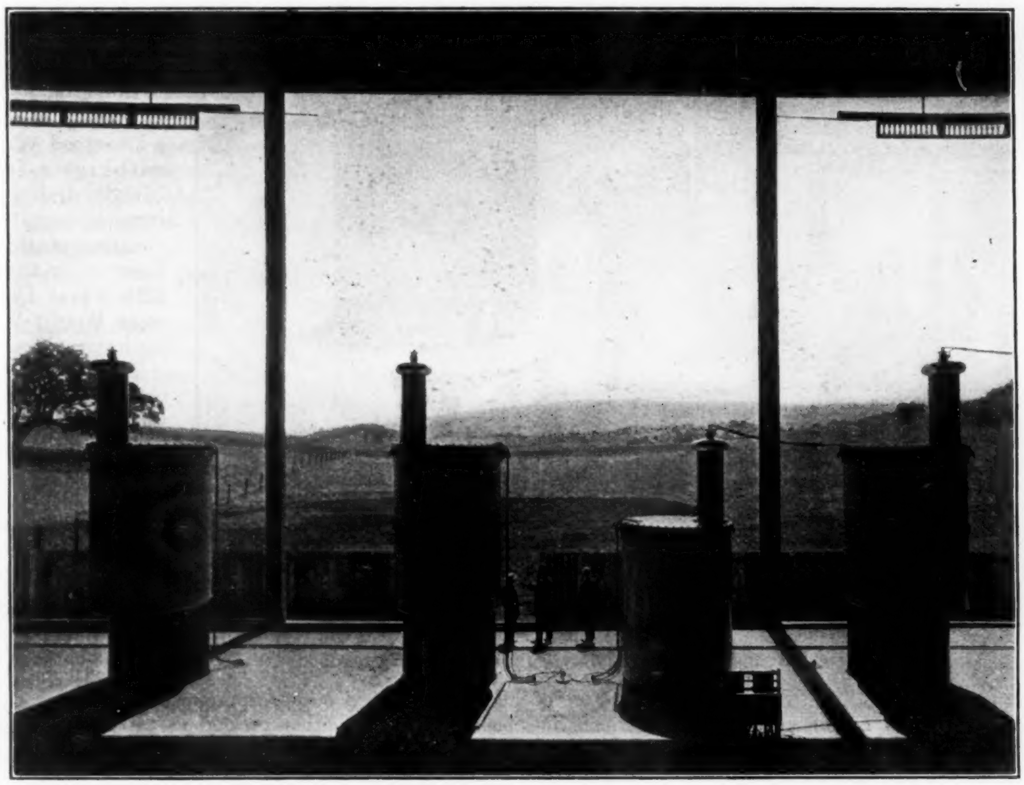

Fig. 1 View of 2,100,000-Volt Research Laboratory at Stanford University
(Note the needle spark gap at top of photograph. A 20-ft. spark is caused to jump this gap when 2,100,000 volts are applied.)

In the Engineering Experiment Station of the State College of Washington is a laboratory for mechanical work, and equipment for research both in electrical and civil engineering is available.

The Oregon State Agricultural College has a high-tension laboratory for insulator testing, special telegraph and radio apparatus and an oscillograph. In the civil-engineering line this same college has complete equipment for structural-material testing; for fuels; for lubricants; for metallographic investigations, and for the study of highway materials. In mechanical engineering it has a very fine outfit consisting of small but comprehensive 10 to 40-hp. engines and turbines; various types of oil and gas engines; automotive and airplane engines; and a very excellent hydraulic equipment including various types of impulse and reaction wheels.

Stanford University has the Ryan high-voltage laboratory, erected primarily for research work in electricity (see Fig. 1). In mechanical engineering it has the Guggenheim aerodynamic laboratories designed primarily for research work. Besides these

[1] Mem. A.S.M.E. and Vice-President 1921-1923.

some of the undergraduate instructional laboratories have mechanical and hydraulic machinery which can be used for research purposes. In addition there are facilities in the instructional laboratories in ceramics and strength of materials which may be utilized also for research.

The California Institute of Technology has a high-voltage laboratory with a 1,000,000-volt transformer (see Fig. 2) that is capable of supplying, with one end grounded, 1000 kva. at that potential. Its civil-engineering laboratory has all the necessary apparatus for standard tests in tension, compression, bending, torsion, fatigue, friction, and hardness. Besides this there is a cement and concrete laboratory that is provided with tables for weighing and mixing, and with full equipment of sieves, needles, molds, etc. for the determination of the properties of cement and concrete in the manner suggested by the Joint Committee of the American Society of Civil Engineers and the American Society for Testing Materials.

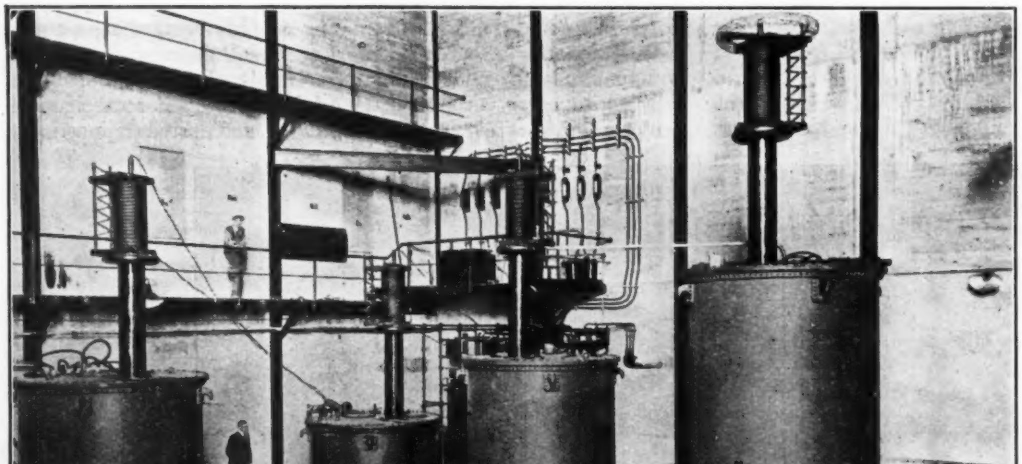

FIG. 2 THE MILLION-VOLT LABORATORY OF THE CALIFORNIA INSTITUTE OF TECHNOLOGY

In addition to the above, the California Institute of Technology has under construction an aeronautic laboratory with space for the study and testing of aeronautic materials. Besides being suited for the making of standard tests, the apparatus may be utilized for research problems along certain other lines, especially if used in conjunction with the equipment of a number of outside industrial plants. The hydraulic laboratory, moreover, is so well equipped with various types of pumps, turbines, and other apparatus that it affords unusual facilities for research along a number of special lines.

At the University of California the electrical laboratory comprises the following equipment: Alternating-current generators: 60-cycle, 500 volts, 3-phase, up to 80 kw.; 133-cycle, 250 volts, 2-phase, 15 kw. Direct-current generators: 110-220 volts, 75 kw.; 500 volts, 5 kw.; 200 volts, 2 kw. Transformers: 4000–125, 250 and 300 volts, 60-cycle, 100 kva.; 50,000 volts, 60-cycle, 10 kva.

High-frequency apparatus: Alternating current, 500-cycle, 5 kw.; Poulson arc, 5 kw.; Vreeland oscillator up to 4000 cycles; vacuum-tube oscillator, 100–50,000 cycles; 1,000,000-volt Tesla coil. Air condensers and inductances for high frequency. A three-element oscillograph, a low-frequency impedance bridge, an alternating-current potentiometer, and an amplifier ammeter-voltmeter are available for graduate work.

In its civil-engineering laboratories the University of California has equipment for materials testing and conducts also sanitary and municipal laboratories. The equipment of the materials-testing laboratory includes machines for measuring impact, torsion, fatigue, and hardness, and for fire tests. Also, a complete assortment of strain-measuring devices. The sanitary and municipal laboratories afford facilities for research in the determination of chemical, bacteriological, and physical properties of water, sewage, air, and municipal refuse.

In the mechanical laboratory of the University of California there is a Babcock & Wilcox longitudinal-drum water-tube boiler of 150 hp. and with a working pressure of 350 lb. per sq. in. (see Fig. 3); also a 42-in. Otis vertical boiler (100 lb. pressure) and a 42-in. Kane gas-fired boiler (200 lb. pressure). These boilers afford excellent opportunities for studying the combustion of high-pressure gas. In addition there is a 60-hp. uniflow engine and a 35-hp. Diesel engine, both of which are available for experimental work; together with a large number of weighing, recording, measuring, and testing devices for steam, water, and gas.

In automotive equipment the University of California includes a low-speed variable-compression carburetor-type engine with Midgley indicator and with testing equipment for automotive and electrical machines. The Naval Reserve Aviation Division of the 12th Naval District has loaned some Wright Whirlwind engines for instructional purposes.

The photometric laboratory is the authorized testing station for the State Division of Motor Vehicles and has a headlight-testing stand and screen, Macbeth and Sharp-Miller illuminators, two bar photometers, an Ulbricht sphere, a General Electric foot-candle meter, a Holophane light meter, and similar equipment.

The University of California also possesses hydraulic laboratories with various types of pumps and turbines, a 50-hp. Sprague dynamometer that may be used conjointly with other mechanical appliances in pump and other testing, a standpipe, weirs, large measuring tanks, etc.

The University of Washington has a dynamo laboratory with alternating- and direct-current generators and motors; 4 three-element oscillographs; an a.c. regulator; a Fahy potentiometer; and a large assortment of accessory apparatus. Besides the above, there is a materials-testing laboratory with 5 Universal testing machines that have a capacity of 30,000–300,000 lb.; 2 impact machines with various hammers ranging in weight from 550 to 1500 lb., together with the necessary auxiliary appliances for general work. The equipment for testing hydraulic cement, made according to the specifications of the A.S.C.E., is complete in all essentials for ordinary testing. The steam and experimental laboratory has all the necessary steam appliances, including simple and compound high-speed and Corliss engines, steam turbines, jet and surface condensers, injectors, etc.

The hydraulics laboratory of this university is situated on the shore of Lake Union, and as a consequence has facilities for both medium- and high-head experiments.

An aerodynamical laboratory completes the splendid outfit of the University of Washington. It contains a standard 4 by 4-ft. wind tunnel with complete equipment of automatic scales for experiments with air foils, streamlined body shapes, and propellers.

The University of Montana has an excellent engineering experiment station which, although constructed primarily for in-

structional purposes, is very well suited for research work. The same may be said of the university steam, gas, hydraulics, and materials-testing laboratories, all of which are located at its engineering experiment station.

Problems Under Investigation by Western Universities

1 Beginning with the California Institute of Technology, there are under way the following electrical investigations:

Protection of oil tanks from lightning; wireless and vacuum-tube problems; insulation of high-voltage circuits; high-voltage and power measurements; speed of lightning arresters.

Along mechanical lines the following problems are under actual study:

- Traffic-regulation signal design and operation
- Improvements in internal-combustion engines
- Performance of boilers
- Fatigue failure of welded joints
- Development of a new type of airplane
- Development of aircraft engines
- Theoretical research on air forces, air flow, and strength of aircraft.

A large number of civil-engineering problems are under study, of which the following are the major ones:

- Permeability of concrete as affected by water-cement ratio and as to various methods of surface impregnation
- Effect of cement content on the strength of mortar
- Causes of deterioration of concrete sewer pipes with respect to the character of the soil, the condition of the sewage in the pipes, and the time of its detention therein
- Shaking-table tests of models of structures with respect to earthquake acceleration and forces
- Strength, disintegration, and permeability of concrete as to its composition and texture
- Adobe soils as subgrade for pavements
- Siphon spillways
- Activation treatment of sludges.

2 The report from Oregon State Agricultural College shows the following work in their electrical laboratories:

- High-tension-insulator tests
- Tests of insulating compounds.

Reports from its mechanical laboratories show research on:

- Carburetors and carburetor adjustments
- Study of velocity and temperature of flue gases in chimneys
- Tests of ventilator capacity
- Research on spark arresters for logging engines.

Civil-engineering problems under actual examination are:

- A survey of Oregon concrete-making materials
- A survey of Oregon fuels
- A survey of Oregon road-building materials
- Effect of sewage on concrete
- Study of corrosion-resistance of steel in gas and water mains.

3 The University of Washington Electrical Department is engaged in solving problems bearing on:

Electric power transmission: 500-mile line with distributed rotary condensers; transmission at unity power factor; properties of electric transits studied through cathode-ray oscillograph and klydonograph.

The problems of the mechanical laboratory are:

- Investigation on the K-B propeller as to aerial propulsion
- Use of small tunnels in aerodynamic experiments
- Efficiency of air fans
- Coal-washing problems
- By-products from sawmill waste
- Series of hydraulic problems on weirs, jets, flumes, and pipes.

In civil engineering the University's present attention is devoted mainly to the following points:

- Waterproofing of concrete and cement
- Study of Washington clays and shells.

4 The University of California has its laboratories engaged on the following large number of interesting and very urgent problems:

Calibration of the sphere gap for high-frequency current; predetermination of the characteristics of the third-brush generator. In the mechanical laboratories: The formula for the Herschel type of weir; characters of various types of pumps; method for measuring water flow; flow of water through jets and diffusers; effect of varying the compression ratio on the performance of the internal-combustion engine; characteristics of automobile fans as affected by their position relative to the radiator; influence of objects such as motors, etc. in the slipstream of an airplane propeller; application of the continuous-beam formula to the fuselage members of airplanes; operating characteristics of high-pressure gas burners; electrolytic and corrosion effects on water pipes and in bearings; operating characteristics of automotive signaling devices and the development of a code for testing.

5 The State College of Washington has the following investigations under actual study:

Mechanical: Electric welds and welding, especially with reference to fatigue; effect of heat treatment and comparison of welding electrodes and welding atmosphere; relation of slip lines to fatigue; effect of variables on microstructure and on chemical composition;

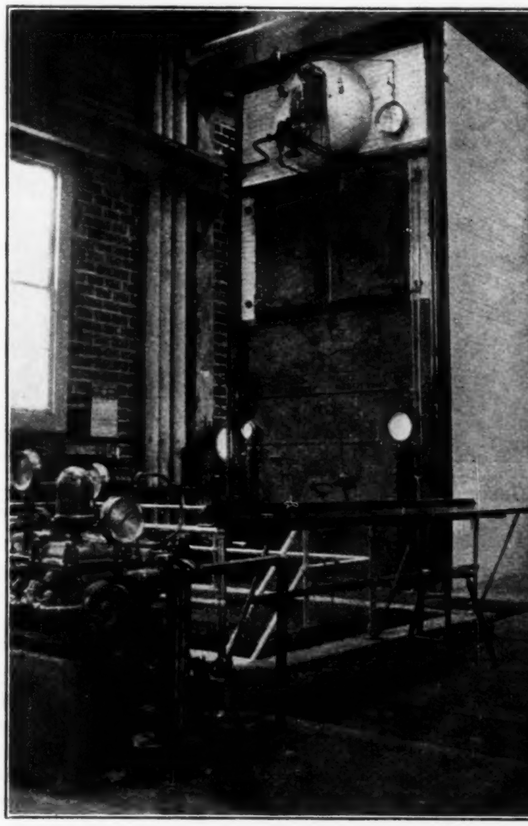

Fig. 3 Portion of Mechanical Laboratory of the University of California

(View shows a Babcock & Wilcox longitudinal-drum water-tube boiler of 150 hp. for a working pressure of 350 lb. per sq. in.)

steam flow meters especially as to the development of a new type; study of automobile lubrication in an attempt to correlate laboratory testing more closely with practical performance; rhythmic corrugations on highways; analysis of the mechanics of tires, axles, springs, and bodies of automobiles with reference to the development of "washboard" on highways; development work on a primary type of viscometer.

Civil Engineering: Permissible organic matter, clay, etc. in modern concrete mixtures; development of a new type of extensometer.

6 Stanford University has the following: (electrical) high-voltage and large power-distribution problems; (mechanical) testing of air propellers; fusion welds; (civil) vibration effects on structures.

7 The University of Montana is working on a study of the laws of the plastic flow of cold-worked steel and on a law of change of moduli of elasticity with cold working; (civil) causes of the disintegration of exposed concrete; development of an economical method of utilizing the Montana chromite deposits.

8 The University of Idaho is engaged on a study of the effect of mica on concrete mortars.

Problems Being Studied by Pacific Coast Industries

Inquiries elicited information from five private firms as to the research work being done by them. As compared with the work under way in the various colleges, the latter make a far better showing, albeit working under a stringency of funds.

The following firms report:

Standard Oil Company of California. The resistibility of various materials to corrosion by soil, by sulphuric or by sulphurous acid, by hydrogen sulphide, and by oxygen at a high temperature; the control of static electricity and of its dissipation; protection against lightning and against static electricity generated by oil transfers.

Willamette Iron and Steel Works. Improvements in water-cooled friction brakes for the absorption of energy at high rates (1500 hp.) for intermittent service and for periods not more than 5 to 10 minutes; application of vacuum-actuated oil circulation in bearings.

Pacific Portland Cement Co. The recovery of potash salt from dust-laden gases in cement kilns; waterproofing of gypsum products; improvement on the strength of the same; improvement of the cement for shutting off water in oil wells; evaluation of muds in the oil industry; effect of high pressure upon the setting and hardening properties of cement used in oil wells.

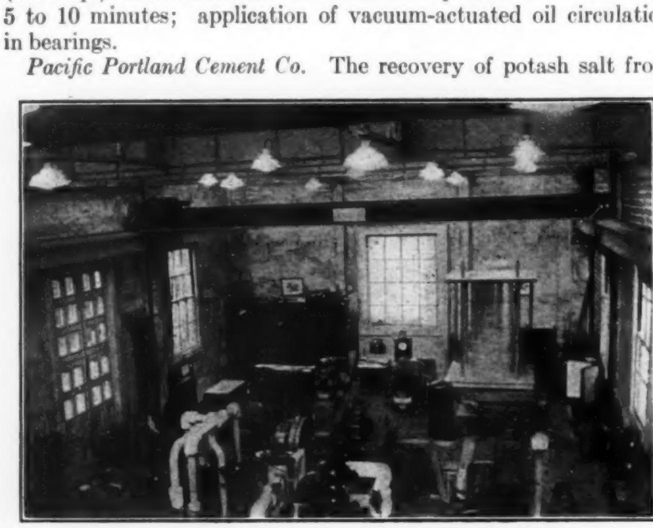

Fig. 4 General View of Hesse Hall Laboratory, University of California, Showing Experimental Steam Turbine in Middle Foreground

Pacific Gas and Electric Co. Hydraulic losses through the butterfly valve; determination of hydraulic forces on a 48-in. butterfly valve under a 200-ft. head with free discharge; testing of water hammer in actual penstock installation; effect of curvature on Kutter's coefficient *n* in concrete-lined canals (test being made in a 400-sec-ft. canal); value of Kutter's coefficient *n* in tunnels (being conducted in the recently completed Melones plant); determination of the friction coefficient in riveted steel pipes, with or without countersunk rivets (being conducted in the Drum penstock); discovery of protective coating for paints; effect of aluminate cement on the strength of concrete; design of electric fuses; designing of oil circuit breakers; effects of surge in an 11-kv. system; improvement of the Pelton waterwheel.

Hall-Scott Motor Car Co. More efficient manifolds for gas engines.

Western Pipe and Steel Company of California. Fusion and arc welding.

Research Problems Deemed Urgent on the Pacific Coast

In answers to our inquiries as to what engineering problems both educational and commercial establishments deemed of more urgent importance for early consideration and study, our records show the following:

State College of Washington. (Mechanical.) Development and application of electric furnaces to steel and other uses; smaller-scale methods for the reduction of iron ore; development of a better tractor for farming, etc. especially with reference to a longer life; improvement in pumping equipment for irrigation.

(Civil.) Better manufacturing and development processes in the fields of ceramics and metallurgy.

Stanford University. (Mechanical.) Heat transfer through walls and films; properties of steam and other vapors; elimination of automobile-headlight glare; automatic signals for control of automotive traffic; requirements for, and the development of, a suitable metal for airplane propellers; methods of pumping in deep oil wells; strains and changes due to fusion welds in metal structure; rod material; better measurement of air velocity in automotive radiators; completion of Taylor's work on metal cutting; a method to forecast the machining qualities of metals; study of the best blade angle and of the position of radiator fans; durability and noise test of gears; determination of gas pressure in molds.

(Civil.) Foundry-sand characteristics and use; effect of vibration on structures; a test for the determination of fatigue in metals.

University of Montana. Causes of the disintegration of concrete work; an economic method for the utilization of the Montana chromite deposits.

Standard Oil Co. of California. Welding practice; drilling tools; heat transfer in metal-insulated materials and in oils and gases; the influence of turbulence in heat transfer; prevention of corrosion in well casings and in pipe lines; harmonic vibrations of deep-well pumps; causes and prevention of the formation of crude-oil emulsions in wells; improved dehydration of crude-oil emulsions; flow of viscous liquids through pipes; improvement of meters, orifices, etc.; recovery of gasoline from artificial gas; prevention of evaporation; distillation equipment; improvement of stills, furnaces, and towers.

Willamette Iron and Steel Works. Economy of machine-tool operations; determination of the effect of velocity on gear teeth and of the relation of the usefulness of gear teeth to the load, speed, form, and material; determination of the useful life of gear teeth in intermittent service such as is found in the logging machines of the Pacific Coast; coefficient of friction of standard brake linings, especially when the clutches are required to pick up full loads with different degrees of acceleration; coefficient of brake linings under actual service conditions and the effect produced as a result of their use; determination of the strength of wire rope; probable life of new cables under known conditions of operation; fatigue of steel subjected to alternating temperature in the case of boilers used intermittently and of such brakes as were mentioned previously; stresses induced in vertical internally fired boilers by intermittent service; best volume and shape for fireboxes for oil burners, and the best ratios of firebox volume and heating surface to the tube surface for various desired efficiencies; electric welding in machine frames, vibration effects; same for gas welding; anti-friction bearings for high temperatures.

Great Western Power Co. of California. Mechanical vibration of transmission lines and its elimination; the relative merits of zinc and cadmium as a protective coating for steel both in the air and under the ground.

Pacific Portland Cement Co. Improvement of acoustic plaster; kiln and cooling efficiencies in the cement industries.

Federal Telegraph Co. Better accommodation on aircraft of radio equipment and devices from a mechanical and electrical point of view.

Western Pipe and Steel Co. Elimination of gas pockets and slag inclusions; better production of the ductile weld by the metal-electrode arc process.

Those Interested in Particular Research Problems

The following names of persons or firms who have expressed an interest in one or more of the problems mentioned above have been submitted in response to the questionnaire:

State College of Washington. In ceramics: Washington Brick, Lime & Mfg. Co., Spokane; Denny Renton Clay Co., Seattle. Those interested in metallurgy: Bunker Hill and Sullivan Mining and Smelting Co., Kellogg, Idaho; L. K. Armstrong, Mining Engineer, Spokane; George W. Evans, Mining Engineer, Seattle. Those interested in development of better types of tractors for farm and other uses: Union Iron Works, Spokane; Moran Bros., Seattle; Dean A. E. Drucker, State College of Washington.

In pumping equipment for irrigation: Pacific Power and Light Co., Portland, Oregon; Washington Water Power Co., Spokane.

Oregon State Agricultural College. On experimental work on carburetors: Automotive Trades Association of Portland, Oregon.

On study of flue gases: Prof. W. H. Martin, Oregon State College.

On ventilator capacities: P. L. Cherry Co., Inc., Portland, Oregon.

On effects of sewage on concrete: Northwest Concrete Products Association.

On study of corrosion resistance of steel: Portland Gas and Coke Co.

Stanford University. Foundry-sand characteristics and use: Industrial Association of San Francisco; Professors Crook and Domonoske at Stanford.

Heat transfer through walls and films: W. R. Eckart of C. F. Braun & Co., Alhambra, Mr. Russel of Standard Oil at Richmond, and Max Thornburg of Standard Oil at Richmond; Professors Dietrich, Domonoske, and Tickell at Stanford.

Effects of vibration on structures: H. D. Dewell of San Francisco, Professors Thomas and Martell at California Institute of Technology, and Prof. Bailey Willis at Stanford.

High-voltage phenomena and handling of large blocks of power: E. F. Scattergood of the city of Los Angeles, Paul Downing of the Pacific Gas and Electric Co., J. A. Koontz of the Great Western Power Co., City of Palo Alto, Pacific Telephone & Telegraph Co., and Prof. Harris J. Ryan.

Elimination of automobile headlight glare: Mr. Snook, Head of the California State Motor Vehicle Division, and Prof. L. M. K. Boelter, University of California.

Automatic signals for the control of automotive traffic: Prof. Miller McClintock of the University of California at Los Angeles, and Director of the Douglas Erskine Research Bureau of Traffic.

Requirements for and the development of a suitable metal for air propellers: Professors Durand, Lesley, and Crook of Stanford.

Method of pumping in deep oil wells: B. & C. Pump and Supply Co. of Los Angeles, and Professor Crook of Stanford.

Study of the fusion weld as regards strength, change in metal structure, rod material, and the limitations as to use: E. O. Wilson of Standard Oil Co., K. V. Laird of Welding Society of San Francisco, and Professor Moser of Stanford.

University of Washington. In aeronautics: The Boeing Airplane Co.; U. S. Bureau of Aeronautics.

In electric power transmission: General Electric Co.; Puget Sound Power and Light Co. Air fans: Western Blower Co. Ceramics: Portland Cement Co.

University of Montana. On study of cold-worked steel: Three Forks Portland Cement Co., Trident, Montana; Standard Construction Co., Bozeman; L. D. Doncling and W. R. Plew, University of Montana.

On development of chromite deposits of Montana: Dean E. B. Norris, Montana State College.

Willamette Iron and Steel Works. Water-cooled friction brakes: E. C. Pape, Willamette Iron and Steel Co.; Carl Christansen of the La Dee Logging Co., Portland, Oregon; Chan Mullen of the Sugar Pine Lumber Co., Pinedale, California.

Great Western Power Company of California and Pacific Gas and Electric Co. Mechanical problems in long-distance transmission of power: P. M. Doning, J. P. Jollyman, P. O. Crawford, W. G. B. Euler, and other men of the light and power industry in California.

Standard Oil Company of California. On welding practice: Southwestern Engineering Co.; C. F. Braun & Co. On distillation equipment: Southwestern Engineering Co.; C. F. Braun & Co.; Power Specialties Co. (Western representative); Keliogg Co. (Western representative).

Conclusions

The foregoing are the results of the inquiries as to the public-service, private, and educational establishments which are actually carrying on work in engineering research. There are a large number of suggestions for further research, together with the names of individuals and firms having an active interest in these and in similar problems.

A comprehensive view of the whole field indicates that there are many problems under investigation having great value to the industries, and that every effort should be made to bring them to a successful conclusion.

It is evident that the universities and colleges are carrying on by far the larger part of the research work, in spite of the very serious handicap due to the general lack of funds for the purpose. And it should be borne in mind that not only is the shortage of funds acute, but at the same time the growth in number of students has increased enormously since the war. Of course the result is that appropriations for anything but the necessary routine activities of all educational institutions are extremely difficult to secure in nearly all cases.

It is here that the engineering societies, firms, and individuals can most effectively assist by doing everything in their power to make or to influence the making of adequate appropriations for research work wherever facilities are available. Considerable has already been done by some of the larger concerns, such as the giving of the electrical laboratories at California Institute of Technology, at Stanford University, equipment at the University of California, etc. However, neither the few larger nor the numerous smaller donations are as generous or as frequent as they might well be.

Several companies have stated that keenness of competition has prevented them from undertaking or providing for research work. This may be true in some cases, but is quite as likely to be a short-sighted policy.

Some of the colleges have been able to increase their appropriations for research with a corresponding increase in their usefulness.

The University of California is one of the few which has been favored in that respect, having increased its research funds from \$2000 in 1917 to \$82,000 in 1926. But many institutions with costly equipment, capable men, and eager executives have been at a standstill in this regard for many years.

We believe now that a more definite knowledge has been attained as to the nature and needs of research in the Pacific Coast states, the years immediately ahead will see funds in an ever-increasing sum available from national foundations and other sources to assist in carrying forward the work.

Washing 7000 Sheet-Metal Parts a Day

A METAL-WASHING machine having a capacity for washing parts for 800 to 1000 automobiles a day is included in the equipment installed to aid rapid production in the new "Pontiac Six" plant of the Oakland Motor Car Co., Pontiac, Mich. This is believed to be the largest machine ever built for this class of work. It was built by the Detroit Sheet Metal Works, Detroit.

The machine is designed to wash and rinse various parts in preparation for enameling after they leave the manufacturing departments. These pieces include the four fenders, two running-board aprons, the radiator splash shield and certain forgings and castings. The work is hung on a monorail chain-pull conveyor and travels over 100 ft. in moving from the entrance to the exit of the machine, whence the same conveyor carries it to a drying oven. The conveyor is operated at variable speeds, traveling at about 25 ft. a minute for a production of about 1000 cars a day.

In the machine are three high-pressure washing zones. The work is first washed with a washing compound and then is given two clear rinse-water sprays. In each cleaning zone 1200 gal. of water is used a minute. This water is recirculated continuously by means of double-suction centrifugal pumps, and is kept clean by an arrangement of grease-skimming baffles and screens.

A partition extends through the center of the machine. The work passes down one side, loops around and returns to the end from which it started. The clear space provided for the work is about 7 ft. high and 4 ft. wide. *Iron Age,* Sept. 22, 1927, p. 788.

Production of "Aldrey," a new aluminum alloy, developed especially for electric-power lines for which it is suitable because of its tensile strength and electrical conductivity, has begun in Germany and production licenses have been granted for both Germany and Austria, the American Consul at Frankfort-on-Main has reported to the Department of Commerce. The production of this alloy is the result of a studied economic policy in Germany to divest the industries of the country of dependence upon primary foreign materials.

Budgetary Control

By J. P. JORDAN,[1] NEW YORK, N. Y.

In the influence held by a chief executive over the mentalities of his subordinates, whereby he secures from them the greatest possible producing effort, lies the real secret of his success. Many executives hold this influence by sheer personality. Others hold this influence by a combination of personality and the careful selection and provision of various schemes whereby the subordinates themselves are more or less automatically spurred on in their efforts.

It is a well-recognized fact that we are a nation of aggressive people; that we take business chances as a matter of course. The widespread interest in sports—golf, baseball, football, tennis, boxing, polo, etc.—is evidence of the sporting angles of the average American mind: the apparent evidence of a desire either to indulge in or to become interested in a game.

Budgetary control supplies to every one in any kind of a business institution a species of a game. The setting of quotas of performance and budgets of expense brings out a cool and calculating thought of the future and what it should yield. The daily watching of the current transactions becomes as fully absorbing as the watching of the electric score board of a World's Series game. A par has been set and must be beaten.

The psychological effect of budgetary control is its greatest asset, and in this feature alone it takes its place as perhaps the most valuable of all more or less mechanical management aids.

THE type of management which pays strict regard to psychological effects in controlling the various operations of a business institution is almost invariably successful. While it is often said that since the war, management has been obliged to control in a manner different from that which obtained before the war, it is probably a fact that the most outstanding cases of successful management before the war were those which employed exactly the same methods as are successful today. Since the war, management in general has been forced to give far greater consideration to the human factors of business than before.

We have heard a great deal about "Golden Rule" management, coöperative management, committee management, legislative management, and all such types which have been more or less successful. If one would analyze the various-named types of management which have been used, it is believed that the final conclusion would be that the outstanding successes have been those where careful psychological analyses became the guide of the executives who composed the successfully managed business, rather than some specific form of management. It is somewhat immaterial as to the exact methods used in applying to a generous degree the results of careful consideration of the psychology of each situation. At no time in industrial history has it ever failed to be clearly apparent that an organization conducted with due regard for the upbuilding of the various key men in the organization is the true method of building a safe, stable, and permanent industrial structure. The prime consideration in the upbuilding of an aggressive and successful organization is a leadership which permits of nothing but absolute fair play to every one in the organization, and which further permits of nothing but absolute coöperation between the various departments of the business, firmly and effectively coördinated by a chief executive whose whole endeavor is to build up every responsible individual in every possible way, thereby automatically elevating the office of chief executive to a plane much higher than otherwise could be accomplished.

Too Few Executives Study the Psychological Factors of Organization Procedures and Personnel Problems

Too few executives study the psychological factors which enter into their organization procedures and into the personnel problems which are ever present in both large and small organizations. Too few executives realize that every human being, no matter whether in a high position or a low one, takes an intense pride in his work, provided his scope of responsibility is so clearly defined that it can be regarded by each individual in a very personal way.

It is exactly this feature which is the basic consideration of bonus incentives, profit-sharing schemes, and all other such plans to bring out a greater personal interest on the part of each individual participating. A worker at a machine does not think half as much of the additional bonus which he makes in his pay envelope as he does of meeting and beating a fixed standard time. Not long ago the author was told that during the preliminary stages of the installation of a bonus plan, and before the workers, or even the foremen, knew what was coming, a gang boss in a foundry became so enthusiastic over meeting and beating the standard times set for the various tasks of his gang that he nearly got into trouble with his men on account of driving them so hard to make a record. Needless to say, when the bonus scheme was announced this enthusiasm not only kept up but it increased to a very remarkable degree, with the result that his particular gang achieved some very wonderful records of performance. The secret in the instance just recalled proved to be what is usually found in the majority of cases, namely, that the psychological effect of making a game out of every-day work has in itself a tremendous measure of merit, even without promise of extra financial reward.

Budgetary control is a mechanism which should be thoroughly understood before it is employed by any management. If an executive who has little use or consideration for psychological effects should think that the installation of a mechanism such as budgetary control will, in itself, produce any great results, he had better stop before he starts. It is in such cases as these where we should find a constant stream of complaint if, and when, the actual results differ to some extent from the budgeted expectations. In these cases, budgetary control becomes simply a guess, and a questionable allocation of actual results against the guess. Mountains of complaint will pile up to the effect that some one was a poor guesser, or else that the accounting department is incompetent because it does not properly allocate actual results against a more or less misguided set of guesses.

All executives who fail to appreciate that budgetary control has its greatest value in its psychological effects on the organization as a whole, are absolutely lacking in one of the greatest essentials of successful management. This not only applies to budgetary control but to any other mechanism for the assistance of management in the proper conduct of business.

The Great Psychological Value of Budgetary Control

If we consider briefly some of the high spots in setting up a budget, we may obtain a clearer idea as to the great psychological value of budgetary control. In every industrial or commercial institution the forecasting of future operations depends primarily on general economic and market conditions. This means that the sales department—that department whose ear is on the ground at all times for future business—must make up its mind to two things: first, as to what it considers the possibilities of business will be for a certain period ahead, and second, as to what portion of the available business it feels it can secure. This is usually built up starting with the salesmen, who are far-flung in the field and who understand their own local conditions; then through branch offices where the various salesmen's figures are combined into the branch expectations; and from there to the main office where the expected business is assembled into one group by classes of product, and even units, if possible. This final assembly will become the quota section of the budget, and as these quotas have been carefully looked over and checked, it is quite reasonable to suppose that every individual in the sales department subscribing to these quotas is prepared to fight to the last ditch to produce the business which he has conservatively stated is possible of accomplishment. Does this not have a most powerful psychological effect on every member of the sales force?

These quotas then become the basis of the manufacturing operations. The raw-material requirements are arrived at by break-

[1] Consulting Industrial Engineer, Stevenson, Harrison & Jordan. Mem. A.S.M.E.

Contributed by the Management Division for presentation at the Annual Meeting, New York, December 5 to 8, 1927, of The American Society of Mechanical Engineers. All papers are subject to revision.

ing down the various specifications of the product required. This gives the purchasing department its cue for the procurement of materials. The manufacturing department computes the force which it needs to produce this business after taking into consideration stocks on hand and delivery requirements. It can arrange its schedules to best advantage for the speed of operation indicated by the quotas submitted.

Should the manufacturing department, on account of its cost of production, feel that the quotas as furnished are not in line with best practices of manufacturing, it can submit to the management its thoughts in this direction, and the sales department can be approached as to what means can be taken to obtain a larger quota should the original one be too modest. The purchasing department likewise may call attention to the fact that the quantities specified cannot be purchased to best advantage, and the management must therefore decide with the purchasing department upon whatever relief may be thought best.

When all of these figures are assembled into a general budget, the controller's or budget department will be able to set up the general results and show a very complete picture of what would happen if the business operated on the basis of the quotas as originally set up by the sales department. A forecast profit and loss would be set up, and the treasurer's department, likewise, could see what funds would be required, how the accounts receivable would accrue, and what the financial state of the business would be at any time during the budgeted period.

The object of these brief references to the high spots of budgeting is simply to bring out the fact that every key man in the organization is *required* to visualize the future, to go through the moves of anticipated transactions before they have been begun, and to live through a specified period of future operations to such an extent that he will become thoroughly imbued with the necessity of making good on the figures which have been set up in the budget. The effect on the mind of each key man is tremendous. He assumes personal responsibility which otherwise could not possibly be assumed, and very few men today will shrink from assuming this responsibility when they are given the opportunity. If this does not involve psychology, then the author knows nothing that does.

When the budgeted period begins, the greatest psychological value of budgeting begins to become apparent. Watching the score of a World's Series game becomes child's play as compared to watching the score of actual results as they are set up against carefully budgeted expectations. In the case of the World's Series game, a cigar or a new hat may be at stake; in the case of the business game there are stakes of different kinds to be won or lost: first, the stake of accuracy of judgment of business and market conditions; second, the accuracy of judgment as to what the selling organization is capable of securing; and third, the accuracy of judgment as to how much it will cost to secure this business. It is a matter of pride to those charged with the duty of setting up the budget to make good and to beat the quota for quantity of business or the budget of expense as originally set up.

In the manufacturing, purchasing, treasurer's, and all other departments the same principles are involved. If the manufacturing department starts out on a schedule and is supposed to reach certain costs, it is the greatest game in the world to make good and beat the objectives which have been set up. If raw materials have been budgeted at a certain figure, the purchasing department will use every effort to beat these budgeted figures. If the treasurer's department think it will be necessary to borrow some money, they will strain every nerve to push forward their collections in order that the amount to be borrowed shall be less than that budgeted. In fact, throughout the entire organization the humdrum routine of every-day business becomes a live and interesting game, and a game of intense seriousness.

Budgetary Controls Supplemented by a Scheme of Bonus Incentive

Now, go a step further and supplement a well-organized budgetary control by a scheme of bonus incentive whereby all individuals concerned can profit individually if the expected figures are equaled or beaten. The class of men occupying the higher positions, and even lower than the higher positions, will respond to the stimulus of budgetary control even if no incentives are provided. It seems to be a natural instinct in every American to want to play a game or to become interested in games which are played. No people in the world support to such an extent the various sports as do Americans. The number of persons who listened to the radio account of a certain boxing match a short time ago probably ran into the millions, and judging from the reports that some of the auditors dropped dead from excitement, there must be a tremendous influence exerted by our great American games.

Any management which allows the every-day transactions of business to drift into a humdrum and tiresome routine is guilty of mismanagement in the higher degree. Budgetary control is not a fancy mechanism to be indulged in by the business connoisseur or method fancier. It is a live and breathing mechanism which brings into play the vision, imagination, action, and whole-souled interest of every individual in an organization who is privileged to become involved in any way with its operation.

Ambient Heat as a Source of Motive Power

By AMBIENT HEAT the author means any kind of heat, be it at a higher or lower temperature, which we have around us, and which we can use more or less freely; for example, the heat contained in the air, in waters of seas, rivers, or lakes, contained in the earth, or directly radiated by the sun. He gives a brief history of the various attempts to utilize these kinds of heat and makes special reference to the "athermic" motor described by Léo Dex in the *Revue Technique* of December 10, 1904. In all of these attempts except that of Dex the lower level against which the cycle worked was too high for continuous use, while in plants depending on solar radiation the night period constituted an obstacle. Dex made his motor work between the upper limit of 10 deg. cent. and the lower limit of —80 deg., the latter being the boiling temperature of liquid carbon dioxide at atmospheric pressure. Dex, however, did not carry his work to practical conclusions. This is what the author attempts to do.

In the cycle used by the author the first step is the introduction of saturated carbon dioxide vapor at —10 deg. cent. The next step is the adiabatic expansion of this vapor down to the utmost possible limit, which the author sets at 0.1 kg. per sq. cm. (1.42 lb. per sq. in.). At the end of the adiabatic expansion, a valve is opened and the condensed liquid discharged. The third step is the compression of the residual vapor in the cylinder or in the evaporator by the return of the piston. The condensed vapor is then sent to the reheater-evaporator by means of a pump. This liquid will become reheated to —10 deg. cent. and will evaporate at that temperature, less a small part which will remain liquid; it will then become mixed with the vapor, will be introduced into the cylinder, and will saturate the residuum from the preceding expansion which became superheated through compression. The author claims that this cycle can be reproduced with a steam engine, and all that is necessary to do so is to equip the steam engine with a discharge valve which opens at the end of expansion during the time necessary to expel the condensed liquid. With an expansion from 20 kg. to 0.1 kg. per sq. cm. (284.4 to 1.42 lb. per sq. in.) 30 per cent of the vapor will be condensed. The greatest trouble in realizing the above cycle that the author foresees lies in devising means to expel the condensed liquid from the cylinder. Ordinary lubrication is unavailable, and it will be necessary to be satisfied with lubricating the cylinder by the condensed carbon dioxide. The author claims, however, that he has an even simpler solution. To produce condensation of the exhaust vapor he vaporizes liquid carbon dioxide (—79 deg. cent.) in the condenser at atmospheric pressure, and claims that he has found a new refrigerating cycle having a low consumption of energy even at low temperatures. He says that he has tested it, but does not describe it. (Emile Guarini, in *La Houille Blanche*, vol. 26, nos. 125-126, May-June, 1927, pp. 73-77.)

Some Factors in Furnace Design for High Capacity

By E. G. BAILEY,[1] FULLERTON, PA.

THE BOILER furnaces of twenty-five years ago were relatively small and rates of combustion up to 50,000 to 80,000 B.t.u. per cubic foot of furnace volume per hour were not uncommon. The boilers were set low and absorbed so much heat from the furnace walls that maintenance of brickwork was not much of a problem except at the clinker zone when burning coal. The principal difficulty was to secure complete and smokeless combustion.

Improvement in efficiency was made by raising the boilers, and year after year volumes were made larger with each new installation. Better combustion and less smoke resulted from the higher furnace temperatures and lower rates of combustion per cubic foot of furnace volume, but more trouble from furnace brickwork was soon evident. This was to be expected as the ratio of areas of furnace wall to the boiler tubes exposed to furnace radiation had increased greatly and the brickwork was heated beyond the fusing point of the ash of much of the coal burned.

In an effort to avoid furnace-wall trouble the furnaces were made still larger, and the walls were moved further away from the active flame, and the flame was "softened" as much as possible, especially in pulverized-coal-fired boilers. The refractory walls were still a serious source of expense for outage and repairs, and there was the added difficulty of getting the ash out of the furnace due to slagging of the boiler tubes or choking of the ash gates. These conditions resulted from heating the coal ash above its fusing point, and applied equally to stokers and pulverized-coal plants.

The accumulation of slag on the boiler tubes choked the gas passages and directly limited the boiler capacity. The remedy has been found in more complete combustion of the particles of coke before reaching the tubes and in the proper spacing of the front rows of boiler tubes. The use of soot-blower elements properly located and protected, supplemented by hand lancing in some cases, permits the satisfactory operation of boilers in this respect.

The removal of ash was made easier by the addition of air through hollow walls and ventilated blocks, or the addition of some water-boxes and cooling tubes along the slag line and in the lower part of the furnace. These meager remedies were successful in some cases but failed completely in others, the difference being largely due to the influence of the fusing point of the ash in the coal being burned or some unnoticed difference in the relative location of the boiler tubes for absorbing radiant heat from the furnace. The better-designed furnaces were often forced to higher ratings until trouble was again experienced.

It seems that furnaces represent the one structure that engineers have built without using a proper "factor of safety." If a better furnace is built it is forced to higher rates of combustion until it shows its weak point, or if a given rate is established, the desire to economize in first cost often results in a structure that has a factor of safety of less than one.

The present tendency of furnace design is to rectify this situation by greater turbulence in combustion and the building of furnaces that will withstand high rates of combustion continuously with minimum outage and maintenance expense. So many engineers in both the manufacturing and operating groups are working diligently on this problem that the economic answer will soon be worked out. It is the purpose of this paper to report some progress in furnace designs for high capacities.

Principal Factors Controlling Furnace Designs

From this brief history of the experiences of the past it is observed that the principal factors that should control furnace designs are:

1 Complete combustion with a minimum of excess air
2 Controllable rate of combustion over a reasonable range
3 Long endurance of furnace walls
4 Prevention of slag on boiler tubes
5 Removal of ash.

The principal difficulty with the earlier furnaces was largely that of securing complete combustion with a minimum of excess air. The furnaces were small and cold due to the proximity of the boiler heating surface, coal was burned on hand-fired grates or on overfeed stokers carrying shallow fuel beds with air coming through in stratified zones. Oil was burned with steam-atomizer burners, resulting in badly stratified flame. The early gas burners were equally bad in this respect, and the first efforts to burn pulverized coal in such small furnaces resulted likewise in poor combustion, plenty of smoke, and damage to the furnace walls.

High combustion rate requires temperature, turbulence, and time. The best results are obtained when each of these three factors is at a maximum. As in all such matters there is an item of cost involved in obtaining each, and the problem is to work out the economical balance for the best all-round results.

While the furnaces being built today are larger than the earlier ones, the rates of combustion are being increased until the B.t.u. developed per cubic foot is practically the same as was common practice twenty-five years ago. There is one advantage, however, in size, even with the same rate of combustion, in that the actual time factor for a given particle in the furnace is greater than if the furnace were small. In other words, there is a certain relationship between the size of the particle of fuel burned and the time which it should remain in the zone of high temperature with a given turbulence to complete combustion with a minimum of excess air. As we now see it, turbulence is a very important factor in bringing this about effectively, which is borne out by the development of forced-draft stokers, mechanical oil burners, turbulent pulverized-coal burners, and in the case of gas, more intimate mixture of the fuel and air as they enter the furnace, together with the higher velocities necessary to produce turbulence and continued mixing as the fuel is being burned.

Turbulent combustion with a minimum of excess air produces high temperatures, and high temperatures facilitate rapid combustion, therefore completing it in a minimum of space. Considering combustion alone, we should use only uncooled refractory walls and have the furnaces as hot as possible. High furnace temperatures are equivalent to high heat potentials, and are analogous to high steam pressures and high-voltage electric currents.

The extended use of air preheaters has a two-fold advantage: first, in recovering waste heat from the flue gases, and second, in accelerating combustion as the fuel and air enter the furnace. Higher furnace temperatures inevitably result from preheated air. It is only the damaging effect of the ash from coal that necessitates the reduction of furnace temperatures to a point where excessive maintenance cost and ash-handling difficulties do not offset the value of the hot furnace. This is borne out in the case of oil-fired furnaces where very high furnace temperatures are desired and attained, even to the point of melting high-grade firebrick.

In the entire history of burning coal the development has been along the lines of keeping the furnace walls and furnace bottom at a temperature below the fusing point of the ash in the coal being burned. The most generally used method of limiting the furnace temperature is by excess air, as the author brought out in a previous paper[2]. Excess air is usually admitted in certain parts of the furnace where otherwise clinker trouble would be most pronounced. This is a very effective remedy up to a certain point, but where the rates of combustion are too high for a given

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Extracts from a paper contributed by the Power Division for presentation at the Annual Meeting, New York, N. Y., Dec. 5 to 8, 1927, of The American Society of Mechanical Engineers. The complete paper may be obtained on request.

[2] E. G. Bailey, "Limiting Factors in Reducing Excess Air in Boiler Furnaces," Mechanical Engineering, July, 1926.

ash the percentage of excess air is likely to become excessive, and therefore interfere with the major requirement of complete combustion with a minimum of excess air. The tendency today, therefore, is to use water-cooling tubes, tied in as part of the circulating system of the boiler, to effect the cooling in different parts of the furnace wall or floors as needed. The nature and extent of such water cooling should be chosen with discretion, especially if the boiler is to be controlled with best efficiency and smokeless combustion is to be obtained over any reasonable range of output.

The second item of the foregoing list, namely, control of rate of combustion, is very important, and excessive cooling of the furnace by either excess air or water circulation interferes with this result. The best performance can be obtained if the air supply can be controlled for proper combustion only, with the furnace as hot as possible, rather than supplying air for the dual purpose of cooling furnace walls and burning fuel. Air cooling, at best, is ineffective for high ratings when burning coal with low-fusing ash.

The remaining three factors, namely, furnace-wall endurance, reduction of slag on boiler tubes, and removal of ash from the furnaces, are all closely associated, as they have to do with the

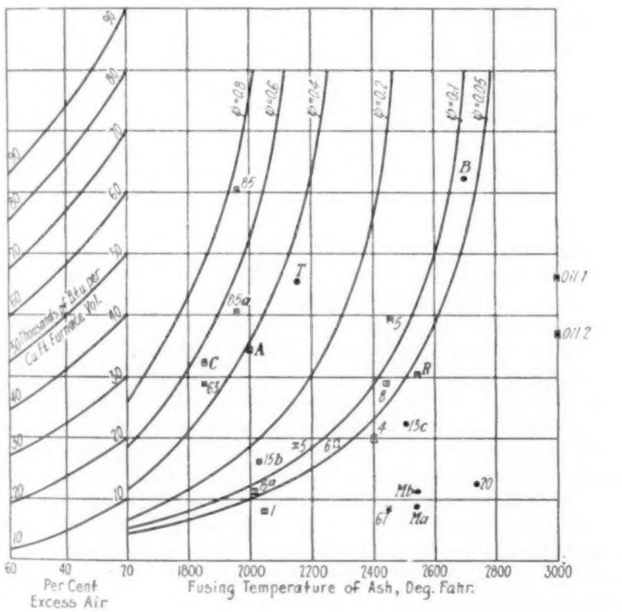

Fig. 1 Data from Actual Operation of Pulverized-Coal, Stoker, and Oil-Fired Furnaces Showing Correction for Excess Air

molten condition of the ash in suspension in the furnace. This is a factor of major importance in pulverized-coal furnaces; and in modern stoker furnaces the fine particles of coke and ash that are carried up from the fuel bed are almost equally important. In either case there is an unlimited supply of ash available so that the quantity coming in contact with the walls is ample to destroy any wall in a comparatively short time unless the wall is protected by cooling it below the fusing point of the ash. While there is merit in using special qualities of refractory to resist the fluxing action of molten ash, only a limited benefit can be derived from this source, for sooner or later the ash will flux, scour, or wash away any and all types of refractory if it is streaming over the refractory in a molten condition. Even in the case of oil there is sufficient ash of a comparatively low fusing temperature to waste away a brick wall in the course of time, but spalling or actual melting of the brick often destroys the walls quicker than fluxing and washing away by the ash from the oil.

The only positive manner of resisting the molten slag permanently is to reduce the temperature of the wall by absorbing heat at such a rate that a film of solidified slag will be maintained on it.

It seems that the importance of the fusing point of ash has not been fully realized in explaining why a furnace of a given design and arrangement gives satisfactory results when installed at one plant, and proves quite unsatisfactory at another.

In Fig. 1 are plotted data from a number of furnaces of various types of construction that represent fairly accurately the upper limit of rating as determined from experience in operation. This includes stoker and oil-fired furnaces as well as pulverized-coal-fired furnaces. The numbered points refer to the different plants as listed in Table 1.

The curves labeled Ψ represent the mean refractory temperature of the furnace walls with different rates of combustion for furnaces with different fractions cold, these values being taken from Wohlenberg.[3] It is assumed that the wall temperature is the same as the fusing temperature of ash.

From the study of the pulverized-coal furnaces listed in Table 1 it is evident that the limiting factors of furnace operation maintaining high rates of combustion divide themselves into two groups so that the one overall figure of B.t.u. per cu. ft. per hr. of total furnace volume does not altogether tell the story. The walls of the furnace zone within the range of flame impingement of horizontal burners are taxed most severely, and the problem of ash removal is most critical.

The problem of wall maintenance is very much easier where the flame is transparent than where it is opaque. The improved results through the use of turbulent burners in pulverized-coal-fired furnaces have minimized the "punishment" on the walls, while the earlier impression of turbulent burners was that it would increase the punishment. This probably resulted from earlier efforts along the line of turbulent burners which did not accomplish such effective mixing, but merely increased the velocity and threw an opaque flame against the furnace wall.

Stoker Furnaces

Modern stokers are operated at rates of firing which liberate 40,000 to 50,000 B.t.u. per hr. per cu. ft. of furnace volume. With forced draft on both underfeed and chain-grate stokers, highly turbulent combustion is taking place within and immediately above the fuel bed. The outstanding problems of capacity limitations are slagging of boiler tubes due to the throwing particles of coke and ash in a molten condition up from the fuel bed, and the erosion of the upper portion of the walls and arches, due largely to the flowing of molten ash over the brickwork, similar to that previously described in connection with pulverized coal. There is also the problem of the building out of ledges of clinker where this molten slag encounters a cooler zone, as well as that of the ash clinker in the fuel bed itself adhering to the side walls and bridgewalls, interfering with the normal motion of the fuel bed and the discharge of the ashes. The actual discharge of the ashes by clinker grinders and traveling-grate stokers is not a serious limitation to high-capacity operation.

Water cooling with bare tubes has not been so popular in stoker furnaces due to the high temperatures and heat intensities at the fuel-bed zone. If a brick wall is built in front of the tubes, slag adheres to it and defeats the main advantage of water cooling. With chain-grate stokers, arches are necessary for igniting the coal, and the hotter the furnace the better. One novel furnace construction without any water cooling is accomplishing a remarkable result. The front and rear arches are brought close together, and with secondary air admitted in the throat of the arch it is possible to operate the furnace proper somewhat as a gas producer with a deficiency in air, which results in a considerably lower furnace temperature at this point than would otherwise be the case. The air necessary to complete combustion is introduced at the throat of the arch, and the temperature immediately above is very intense.

Experiments are now under way in which a series of tests will be conducted with all bare blocks and later with blocks and bare blocks only around the fuel-bed zone, in order to determine what difference there is in efficiency due to the different types of construction.

Ash Removal

Removal of ash is more of a problem in connection with pulverized-coal-fired furnaces than it is with stoker-fired furnaces, and very often the removal of ash is a critical point in operation and

[3] W. J. Wohlenberg and F. W. Brooks, "Some Fundamental Considerations in the Design of Boiler Furnaces," paper presented at Tri-State Power Meeting of the Erie Section, A.S.M.E., Erie, Pa., June 3 and 4, 1927. Fig. 6.

TABLE 1

Ref. No.	Station	Heating surface, sq. ft.	Type	Burners	Fusing pt. ash, deg. fahr.	Furnace volume, cur ft. Total	Furnace volume, Per cent below top of burner	Fraction cold	Excess air, per cent	Steam output, lb. per hr.	Heat liberation B.t.u. per cu. ft. per hr. For total furnace	Heat liberation, For volume below top of burners
	Pulverized Coal											
67a	Trumbull Steel	5,000	Stirling	Flare	2400	4,637	33	0.150	32	46,500	12,200	37,000
Ma	Merrimac Chem.	3,670	B&W	Flare	2500	1,711	70	0.127	40	16,600	14,000	20,000
Mb	Merrimac Chem.	3,430	B&W	Turbulent	2500	2,745	65	0.127	40	20,700	17,000	26,100
13a	Narragansett	6,000	B&W long drum	Couch	2500	2,180	48	0.175	35	40,000	27,600	57,000
B	Bayonne	2,755	B&W marine	Turbulent	2700	255	54	0.200	38	13,706	75,062	139,000
63	Calumet No. 22	5,938	B&W cross-drum	Calumet	1850	12,300	54	0.900	25	285,000	30,000	56,000
85a	Buffalo No. 15	12,515	B&W cross-drum	Calumet	1950	10,200	17	0.820	18	275,000	40,450	234,000
85b	Buffalo No. 13	12,515	B&W cross-drum	Calumet	1950	5,076	55	0.683	20	225,000	60,000	1,100,000
85b	Buffalo No. 13	12,515	B&W cross-drum	Calumet	1950	5,076	55	0.683	20	150,000	40,000	750,000
15b	Cahokia	18,010	B&W cross-drum	Lopulco	2010	13,500	..	0.611	33	140,000	17,000	....
15a	Cahokia	18,010	B&W cross-drum	Lopulco	2010	11,750	..	0.395	33	110,000	14,000	....
6a	Colfax	27,680	B&W cross-drum	Lopulco	2250	17,050	..	0.465	32	320,705	21,800	....
20	Columbia Power	15,110	B&W cross-drum	Vertical	2700	12,000	..	0.084	39	160,000	18,500	....
8b	Fordson	26,470	Ladd	Lopulco	2450	22,000	..	0.778	25	460,000	29,000	....
1	Lakeshore	30,600	Twin Stirling	Lopulco	2050	26,000	..	0.309	45	286,200	15,000	....
5b	Lakeside	17,500	Edgemoor	Lopulco	2100	12,040	..	0.310	22	150,000	17,000	....
4	Trenton Channel	29,087	Stirling	Lopulco	2400+	25,140	..	0.371	25	392,000	22,270	....
	Stokers											
A	Aurora	10,010	B&W	Chain Grate	2000	2,700	..	0.426	40	93,000	43,500	....
C	Crawford	16,220	B&W cross-drum	Chain Grate	1950	5,577	..	0.623	34	157,905	38,000	....
R	Richmond	15,700	Stirling	Underfeed	2500	6,700	..	0.424	22	224,000	31,000	....
S	Saxton No. 5	11,120	Stirling	Underfeed	2410	4,749	..	0.345	24	138,500	41,000	....
T	Twin Branch	14,086	B&W	Chain Grate	2150	5,440	..	0.117	28	166,000	45,700	....
	Oil											
Oil	2 San Diego	10,940	B&W	B&W Mech.	..	4,178	70.8	0.59	10	120,000	39,000	55,000
Oil	1 Long Beach	15,000	Connelly	B&W Mech.	..	7,733	40.3	0.218	10	180,000	31,000	77,000

limits the capacity or causes undue outage. Brick walls may waste away and have to be rebuilt, but in any event it takes time, usually several weeks or months, between repairs to brick walls of any kind. If a furnace is not satisfactorily designed and operated with respect to the removal of ash, the accumulation of a day's, or at most a week's, run will cause boiler outage or operation at reduced rating and high excess air during the period of ash removal, which is often very difficult and laborious.

As shown in some of the illustrations, in the complete paper, flat-bottom brick floors are satisfactory for ash removal and for high rates of combustion if the ash has high fusing temperature and if a furnace with a proper fraction cold is used. Other combinations with partial water cooling are all right up to the point where high rates of combustion and ash of low fusing temperature make all such means more or less ineffective. If the ash is molten on the side walls and runs to the lower part of a cooled furnace or ash hopper, the ash solidifies into a hard, dense mass and the furnace must usually be taken out of service in order to dig it out. This, of course, is not satisfactory operation. There are four possible ways of handling such ash:

1 The entire furnace is kept so cool that all of the ash is in a loose, spongy condition and can readily be removed by gravity or with slight assistance from a hoe.

2 The molten ash accumulates on sloping, smooth, water-cooled floors, to which it will not adhere, but avalanches to the ashpit from time to time, or is easily pushed into the ash hopper.

3 The furnace is arranged so that the lower part is hot enough to keep the molten ash in a liquid condition so that it drips continuously into the ashpit.

4 Molten ash accumulates on the floor of the furnace to a depth of six to twelve inches and is tapped out in a liquid condition intermittently. This is being done at Buffalo.

The last method has many advantages and it aids in keeping the furnace hot at the point most needed for high rates of combustion. With the proper construction of floor and side walls at the slag line no serious maintenance problem seems to be involved. The ash is in condition for many uses which will return revenue. Furthermore, the ash from the other parts of the boiler setting, and from economizer and air-heater hoppers, can be run into the furnace and melted into the same mass and handled satisfactorily, as against the problem of getting rid of fine pulverized-coal ash, which is a source of expense rather than revenue in most cases.

Comparison of Results

It is believed that Fig. 1 will serve a useful purpose in comparing one furnace with another and in determining approximately what would be the limitations of a furnace if the rate of combustion were changed or a fuel with another ash-fusing temperature were burned. The author does not claim that this is the last word in measurement of furnace operation, nor even the best basis for comparison. However, it is a step in that direction, and as other furnace-operating conditions are determined and plotted on some such basis, it will lead toward a better comprehension of the problem of furnace design. If this basis does not make true comparisons possible, modified factors and methods of comparison may then be worked out.

It is now believed that the fusing temperature of ash is a very important factor in furnace design where any refractory material is involved; it is also closely related to the question of ash removal, even from water-cooled furnaces, as an important limitation of continuous and satisfactory operation.

Each furnace has its critical point, so to speak, and this is usually the rate of combustion at which the molten ash starts to flow over the walls, arches, or furnace floor. Below that point the life of the ordinary brick furnace would be many times that which would be obtained when operating at slightly above that point. The more fluid the ash—in other words the higher it is heated above its melting point—and the greater volume of ash present in the furnace, the more rapidly will any refractory construction be carried away. There seems to be only one barrier that will stop the erosion of a wall under such conditions, and that is temperature reduction to the point where a film of slag is frozen and remains frozen at a safe point in the wall construction. The conductivity of refractories is so low that air-cooled walls have not proved effective for the more severe operating conditions, although they serve very well in a given range. Water cooling, with proper contact between the water tubes and the face of the wall so that the required amount of heat can be carried away, is necessary to maintain the surface below the fusing temperature of the ash.

It is desirable in every possible case to have the furnace at as high a temperature as the fusing point of the ash will permit to insure rapid and complete combustion and freedom from smoke with a minimum of excess air. No matter what kind of furnace construction, if it is built for endurance and will retain a film of ash slag, the final wall-surface temperature will be substantially that of the fusing point of ash, thereby permitting higher furnace temperatures with the ash of higher fusing temperature. On this basis it is difficult to obtain as good combustion efficiency from coals having ash of a low fusing point as from coal having ash of a high fusing point.

When burning pulverized coke or anthracite the question of the fusing point of ash is of extreme importance. It is impossible to burn low-volatile fuel satisfactorily without a very hot furnace. If the ash from such fuel has a low fusing point then it will cut into any wall, either destroying the wall, or, if the wall is water cooled, bringing the equilibrium temperature to such a low point that maintenance of good combustion efficiency is not obtainable.

Rates of Heat Transfer

The water cooling of furnaces is primarily for the protection of the walls against erosion and to facilitate ash removal. There is also an advantage from the evaporation which takes place within

such walls and which adds considerably to the total boiler unit capacity, or else reduces the flue-gas temperature and increases the efficiency at the same total rating. As to whether or not this extra steaming capacity can be supplied more economically in the boiler proper or in the wall tubes depends upon the rate of combustion and the fusing point of ash in the coal being burned. With ash of high fusing temperature very little cooling is needed, and therefore the heat absorption in the water-cooled walls should not be great. On the other hand, when going to high rates of combustion with coal having ash of low fusing temperature, a great deal of heat must necessarily be absorbed from the furnace.

One figure in the complete paper shows the rates of heat transfer through two different kinds of block-covered tubes. With one kind of blocks (the BA) as high as 70,000 B.t.u. per sq. ft. per hr. is absorbed, while with the bare iron blocks rates of heat transfer up to 120,000 B.t.u. have been obtained. Individual readings from bare iron blocks in the No. 13 boiler furnace at Buffalo showed some rates of heat transfer over 160,000, but this was beyond the range of satisfactory operation. Both bare and BA blocks have remained in continuous and satisfactory service up to 50,000 to 60,000 B.t.u. per sq. ft. per hr. As some of these figures approach the generally accepted rates of heat transfer for bare tubes, the question is often asked, How can such high rates of heat transfer be obtained through a refractory-block-covered wall when furnaces with bare tubes do not show much higher rates? The explanation is that a higher furnace temperature is maintained with the block-covered wall, and as the rate of heat transfer by radiation varies as the difference of the fourth powers of the absolute temperatures, it is obvious that with a covering on the tube the furnace temperature increases until the equilibrium point is reached.

Summary

1 Combustion requires temperature, turbulence, and time. A reduction in the value of any one of these items must be counteracted by an increase in one or both of the others.

2 To burn a given quantity of fuel in a given time and keep each particle of fuel within the furnace a relatively long time requires a large furnace. Large furnaces are expensive, therefore it is desirable to reduce the "time" factor to a minimum and burn fuel at very high rates of combustion. This is the present tendency.

3 High temperatures are conducive to rapid and efficient combustion, but high temperatures tend to destroy refractories, water cooling tubes, and all wall structures, and it is therefore necessary to properly control furnace temperatures.

4 Turbulence is the only remaining factor and this can be increased very profitably as it depends largely on burner design and furnace arrangement plus a slight amount of power to give the fuel and air the necessary entrance velocities.

5 Turbulence is best accomplished by violently mixing the proper proportions of fuel and air immediately as they enter the furnace and continuing the turbulent mixing action throughout the furnace. This is effected more or less satisfactorily in forced-draft stokers, as well as in many types of oil, gas, and pulverized-coal burners.

6 Turbulence minimizes the volume of intensely hot opaque flame and makes the burning gases more quickly transparent. This transparency permits the furnace-wall temperatures to equalize by radiation, reducing damage from hot spots to either boiler tubes or furnace walls.

7 The most difficult part of the combustion process is to burn completely the minute particles of carbon floating in the furnace gases from both stokers and pulverized fuel.

8 The most troublesome material to deal with in the furnace is the floating particles of ash, especially when fusing point is below the furnace-wall surface temperature.

9 The fusing point of ash is usually the most important controlling factor in establishing the rate of combustion, excess air, labor of operation, and cost of furnace maintenance for a given design of furnace.

10 Ash in pulverized-coal-fired furnaces should be kept below its melting temperature and removed dry or else handled and removed entirely in the liquid state. It is not feasible to have ash melt and then solidify within the furnace except on smooth, sloping, water-cooled floors. There are many advantages in removing the ash from the furnace in a molten condition.

11 To burn coal having an ash of low fusing temperature at high rates of combustion requires some form of furnace cooling throughout all walls, as no refractory has yet been produced that will continuously withstand the washing action of flowing molten coal ash.

12 Water-cooling tubes, connected in with boiler circulation, have proved very effective in furnace-wall construction, when the precautions have been taken (*a*) to provide ample circulation, (*b*) not to expose bare vertical tubes to excessive flame temperatures, and (*c*) to keep the rates of heat absorption into wall tubes less than those into the boiler tubes when using scale-forming water.

Some Operating Data of Large Steam Generating Units

By HENRY KREISINGER,[1] NEW YORK, N. Y., and T. E. PURCELL,[2] PITTSBURGH, PA.

There is a strong desire among power-plant designers to use large steam generating units for large central stations and to operate them at as high a percentage of rating as possible. This desire for large units and higher percentages of rating has been greatly stimulated by the rapid and successful development of the burning of powdered coal under steam boilers. In fact, it was powdered coal that made large steam generating units possible. Stoker-fired furnaces for such large units seem to be beyond serious consideration. Some power-plant designers feel that one large steam generating unit supplying steam to a large steam turbine would probably turn out to be the most satisfactory and the most economical design for a central station. They also feel that large units could be operated satisfactorily at much higher percentages of rating than smaller units.

Advantages and Disadvantages of Large Steam Generating Units

The advantages that are expected from such large steam generating units operated at high percentages of rating are (*a*) lower first cost, (*b*) lower operating cost, and (*c*) lower maintenance, particularly with properly designed furnaces having ample combustion space for efficient burning of coal, and water- or steam-cooled furnace walls.

The lower first cost of a large steam generating unit capable of the same steam output as a number of small units is generally admitted. The lower operating cost of large units is not disputed any more than the lower operating cost of large turbo-generators. At the first thought there may be some question as to the lower maintenance. With the refractory furnace walls that were commonly used with the small boiler units some doubt might be justified. It would seem to be quite a problem to design and maintain such high and wide refractory furnace walls. However, with the modern water-cooled furnace walls the problem is much simplified. The cost of the water-cooled walls should not be much, if any, greater than the refractory walls, and surely it

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[2] General Superintendent of Power Stations, Duquesne Light Company.

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would seem that the maintenance cost of the water-cooled walls would be smaller. It should be easier and cheaper to replace tubes than to repair refractory walls. Then, too, the fact that a large furnace has a much smaller furnace-wall surface than several small furnaces of the same capacity should not be lost sight of.

Against the large steam generating units can be cited the fact that in case the unit is disabled there is too much investment idle during the time necessary for repairs. However, the same objection can be cited against large turbo-generators. In spite of this objection, large turbo-generators are constantly gaining in favor. It is a question whether or not a large steam generating unit can be kept as long on the line as a large turbo-generator. There are indications that a properly designed large steam generating unit is as reliable as a large turbo-generator. In fact, some operating engineers think that a large steam generating unit can be kept in service longer than a large turbo-generator.

Desirability and Practicability of High Percentages of Rating and Limits Thereto

The desire for high percentages of rating is economically justified, particularly for peak-load periods. High percentages of rating reduce the first cost of the equipment and thereby lower the fixed charges. The life of power-plant equipment is comparatively short. It is short not because the equipment wears out but because it becomes obsolete. Therefore it seems good economics to get from the equipment as much return as possible during its life, and wear it out rather than allow it to become obsolete.

The data presented in this paper show that steam generating units large enough to supply steam for 30,000 to 40,000 kw. capacity are in satisfactory operation and that they are practicable. The data also indicate that still larger units are possible.[3]

The data further indicate that the large steam generating units can be operated at 400 to 600 per cent of the nominal rating of the boiler proper, provided that the furnace is of sufficient size and use has been made of water-cooled furnace walls.

The limit to high percentages of rating at present seems to be set by the slagging of the first and second row of boiler tubes, and the choking of the gas passages through the boiler. The percentage of rating which can be obtained before this limit is reached depends largely on the fusion property of the ash. This limit can be raised by wider spacing of the first two or three rows of tubes. The wider tube spacing will lower the entrance velocity of gases into the boiler so that the molten ash will not be plastered on the boiler tubes. By the time the gases enter the closely spaced tubes the temperature of the gases and the ash is sufficiently lowered so that the ash does not stick to the tubes.

The wide spacing of the lower rows of boiler tubes is particularly advisable with coals having fusible ash and when highly preheated air is used for combustion. With the steadily increasing practice of heating the feedwater by turbine bleeding, the air heater is taking the place of the economizer and highly preheated air is used for combustion. This highly preheated air raises the furnace temperature and increases the difficulty with the slagging of the tubes. The need of giving attention to the proper spacing of the first three rows of boiler tubes and other provisions for keeping the slag off the boiler tubes is therefore apparent. This is particularly true of the horizontal water-tube boiler where the gases strike the tubes nearly at right angles.

It would seem that a design of the type of the steam generating unit of the Fordson Plant is well adapted for operation at high percentages of rating as far as the slagging of the boiler tubes is concerned. The gases on their way to the entrance into the boiler pass through the narrowing space between the two banks of boiler tubes and are cooled to some extent before they strike the boiler tubes and the temperature of the ash is reduced below its sticky point. Another good design in this respect would seem to be a single boiler of the Stirling type having the wall opposite the first bank of tubes made of water-cooled surfaces similar to the Lakeside Station 1200-lb. steam generating unit. The gases pass through the narrowing space between the first bank of tubes and the water-cooled wall, and are cooled to an appreciable extent before they enter among the boiler tubes.

Another limit to the high percentage of rating is the power necessary for the operation of the induced-draft fans. However, this limit seems to be high up in the percentage of rating. It takes only a simple calculation to convince oneself that one is justified in using considerable power when he can make an extra 100,000 lb. of steam per hour with almost no fixed charges and additional operating labor.

Summary of Principal Factors in the Operating of Large Steam Generating Units

1 Factors Limiting Ratings:
- Draft limitations
- Slagging of boiler tubes and choking of gas passages through the boiler
- Slagging of furnace
- Large losses from incomplete combustion
- Smoke.

2 Possibilities of Increasing Ratings:
- Increasing draft by the installation of large induced-draft fans
- Using wider spacing on the first three rows of tubes of horizontal water-tube boilers to avoid slagging of boiler tubes
- Taking advantage of designs which make it possible to pass the furnace gases between two banks of tubes before the gases enter among the boiler tubes
- Using water-cooled surfaces in furnace to avoid slagging of furnace and make removal of ash easy
- Using furnaces of large combustion space
- Admitting coal and air into the furnace in such a way as to produce good distribution of coal and air, and effective mixing in the furnace.

3 Range of Percentage of Rating Giving Satisfactory Operation:
- In most plants the ratio of 1 to 4 is satisfactory. In a few plants this ratio is 1 to 10. At the very low percentages of rating satisfactory operation depends a great deal on the proper distribution of coal and air, and on the uniform feed of the coal.

4 Percentage of Service. This should be high and depends on the following factors:
- Careful operation
- Pure feedwater
- Close inspection of parts that are likely to fail when boiler is down for general cleaning and overhauling
- Good design and workmanship of all parts of the steam generating units, as well as of all of the auxiliary equipment
- Close attention to all details including those seemingly unimportant.

5 Can Outage on Steam Generating Unit be Foreseen, Postponed or Prevented?
- Many causes for outage can be foreseen and avoided with close supervision and careful operation. A few of them, such as failure of boiler tube or superheater element, are difficult to foresee; however, good feedwater will go a long way toward preventing such failures. In fact good feedwater is easily the most important factor for a long service of a steam generating unit.

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[3] The complete paper gives the principal operating data of six large steam generating units fired with pulverized coal, and installed in four plants. Two of these units are the remodeled boilers of the Fordson Power Plant of the Ford Motor Company, Fordson, Michigan; the third unit is one of the first five pulverized-coal-fired boilers of the Colfax Plant of the Duquesne Light Company near Pittsburgh; the fourth unit is one of the two boilers of the Stanwix Plant of the Allegheny County Steam Heating Company in Pittsburgh; and the fifth and sixth units are the two units of the Gould Street Station of the Consolidated Gas Electric Light and Power Company of Baltimore. All these plants use the storage system of burning pulverized coal, and the units are fairly representative of the large steam generating units now rapidly coming into use.

The operating data are presented graphically and consist of the hourly output in pounds of steam throughout the period of operation. Whenever the steam generating unit was shut down, the reason for this shutdown is given. There are also presented charts giving the necessary data for the computation of the efficiency for various percentages of rating such as the temperature of flue gases, the percentage of CO_2 in the flue gases, and the losses due to incomplete combustion.

The Development of Machine Tools from a User's Viewpoint

By F. C. Spencer,[1] Chicago, Ill.

During the last ten years many improvements have been incorporated in machine tools of practically all types. In some instances radical changes have been made, but many of the improvements have been simply adaptations of features already "proven in" by years of service in other types of equipment. For example, it is not unusual today to see featured in machine-tool advertisements such statements as "roller bearings," "ball bearings," "wick oiling," "continuous pressure oiling," "hydraulic control," and "built-in motor drive," although only a few years ago these entirely practical features, which mean so much in the matter of obtaining continuous high-speed production, were conspicuously absent.

Many new types of production machinery have been originated within the last decade, and the demand for these indicates clearly the opportunity for the development of equipment more adaptable for certain kinds of machining operations than the general-purpose machine tool. It is being appreciated that the more nearly a general-purpose machine approaches a special-purpose machine, the more efficient and the more valuable for manufacturing purposes it becomes.

During this same period many of the larger users have taken an active part in machine development, and many improvements have resulted from suggestions originating with them. This has been true to a large extent of the automotive industry. Today the builder welcomes, and in fact solicits, suggestions, a condition quite different from that which prevailed fifteen years ago. This collaboration of the user with the builder in machine development is of the utmost importance to the builder, as it must be recognized that he must produce that which the user will buy.

The engineering and design of machine tools is strictly a function of the builder and should remain so. In order that satisfactory returns may be realized from the investment in machine tools, however, it is imperative that the user assist the builder by furnishing all the manufacturing information necessary to produce machines which his experience has taught him will more adequately meet the requirements of continuous quantity production.

In the plants of the Western Electric Company a large quantity of medium-sized production machinery is needed to produce the enormous number of parts required every year for the manufacture and maintenance of the telephones and associated equipment of the Bell System. The problem of manufacturing this equipment economically depends for its solution mainly upon the machine tools selected for the job. The magnitude of the problem will be more fully appreciated if it is realized that the telephone equipment manufactured by this company consists of 13,000 different kinds of apparatus assembled from 110,000 different component parts. For several years it has been necessary to purchase or build from two to three million dollars worth of machinery per year for the purpose of reducing manufacturing costs or for increasing capacity.

The selection of the machine tools for this job is one of the functions of the development organization at Hawthorne. The organization consists of several hundred engineers whose function it is to study constantly every factor affecting the cost of production from the raw material to the finished product. About 35 engineers of this group are employed in the study of machining methods and the standardization of machine equipment, and about 85 designers are required to provide the designs for special-purpose machinery and changes in design or additions to standard machines when necessary to meet the requirements of this company.

These engineers develop all machining methods and select the standard machine tools which are required to meet the production schedule. They keep in close touch with builders of standard machines, and because of their more intimate knowledge of manufacturing conditions and requirements, have been of considerable assistance to the builders in developing machines superior to previously existing models.

Machinery Designs

The standards adopted by this company affect the design of machines with regard to both their economic and humanitarian aspects and include the following:

1. Minimum floor-space requirement
2. Elimination of accident hazards as far as possible by properly designed guards
3. Reduction of physical effort by the provision of convenient operating arrangement
4. Cleanliness, secured by preventing machine and cutting lubricants from leaking or being thrown from the machine
5. Appearance.

To meet established standards satisfactorily, manufacturing machinery must be compact so as to occupy as little floor space as possible; it must be ruggedly designed to insure accuracy; it must be efficiently lubricated to reduce maintenance; all parts must be easily accessible, though moving parts should be enclosed or be properly safeguarded to remove accident hazards, and they should be arranged for individual motor drives, preferably with the motor located in the base. They must conform to the latest and best practice with respect to materials, bearings, gears, and chains, and workmanship must be of a high order. All of these requirements are incorporated in most tool-room machines, but until all production machines are built in accordance with these general specifications there will continue to be opportunity for improvement. To insure a standard of high quality the Western Electric Company finds it necessary to dismantle practically every machine bought so that it can be thoroughly inspected and replacements made or workmanship improved, if necessary, before the machine is placed in service.

Motor-Drive Program

Up to 1914 very few machine tools were available with well-designed motor drives. In that year it was decided to motorize the entire plant consisting of about forty-five hundred machines. The plan adopted involved, first, the development of individual motor drives for each type of belt-driven machine considered sufficiently modern and suitable for manufacturing purposes and the replacement of all types of machines unsuited to such drives, and second, the policy of purchasing only motor-driven machines for additional capacity.

The motorization of the belt-driven machinery involved a great deal of expense for design and construction work but has now been completed. During these thirteen years progress in the machine-tool industry toward properly guarded machinery and well-designed motor drives has been slow, and consequently it has been necessary to keep several designers and a large force of mechanics on this class of work constantly to take care of the additional equipment bought to increase manufacturing capacity.

The second phase of the plan has presented the most difficult task of the motorization problem—that of persuading the builder to design and build his equipment in such a manner that it could be belt or motor driven at the option of the purchaser.

The problem of motorizing belt-driven milling machines was attacked by locating the motors on brackets in the rear of the machines. This resulted in an increase in the floor space occupied, and indicated clearly that the future development of the milling machine would involve the incorporation of the motor in the base of the machine, totally enclosed, and properly ventilated. This idea was submitted to a few of the largest milling-machine builders,

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who, however, did not consider it advisable to change their line and offer it to the market in general, but expressed their willingness to build a certain minimum quantity. To do this it was necessary for the company to hold up purchases until a number of machines could be ordered sufficient to warrant the builder in changing the standard design. When these new machines with the built-in motors were finally installed the arrangement was found to be highly satisfactory, and the scheme has since been adopted by all the leading builders.

In addition to doing away with a forest of belts and overhead work, an endeavor has been made to limit the heights of the machines, as it would obviously be inconsistent to go to the great trouble and expense involved in the motorization program and then to permit the machines themselves to obstruct the light.

Late-model multiple screw machines, for example, ordinarily furnished with the motor on top, are arranged with motor drives built in or on a special bracket so located that the height of the machine is not increased, and are a radical departure from standard equipment. The small machines have the drives built in the bases. In the case of some of the larger machines the motor is located at the stock end of the machine on a special base. A chain connects the motor to the drive shaft which extends through the machine and drives the spindle at the other end by means of a second chain. The shaft is mounted on self-aligning ball bearings and is completely enclosed in a tube. With this construction not only has the height been reduced but the motor has been placed in a more accessible position, the floor load has been more evenly distributed, and the vibration appreciably reduced. Also a two-speed motor is used instead of the single-speed usually recommended, thus providing a wider range of speeds without changing chains or sprockets.

Punch Presses

For blanking operations punch presses are superior to gap-type presses because the ram is guided more satisfactorily and there is very little chance of misalignment of the tools. In the gap type the frame opens up slightly with each stroke of the press, and more expensive sub-press tools must be built to overcome this inherent fault. For second-operation work, however, the gap type is preferable, but in most cases the designs could be greatly improved.

In a plant using hundreds of medium-size presses and blanking and forming millions of parts per year, it is of the utmost importance, first, that these machines be safe to prevent injury, thus obviating lost time and a demoralized morale, and second, that they be constructed so that maintenance will be low in order that they may be kept constantly active. Western Electric Company punch presses are individually motor driven, having incorporated in their construction a special design of friction motor drive; the bearings are bronze bushed throughout and the crankshaft bearings are split on an angle so that the upper bearings in the frame take all the upward pressure and the caps none. The crankshaft is made of heat-treated chrome-nickel steel as a matter of safety. The ram connection is provided with a shearing ring to protect the press from overload and the arrangement is such as to permit easy replacement of the ring whenever necessary. A U-bolt is used for clamping the cap against the punch shank. The clutch is of the rocking-key type. The flywheel, which is mounted on ball bearings, is provided with several key-locking grooves to effect a minimum of clutching time.

These presses are completely guarded, including a balanced swinging gate operated by the foot treadle in such a manner that it is in place in front of the die space before the clutch is tripped, and side gates to prevent the operator from reaching around the front guard. These are so arranged that when swung open the clutch rod is locked and the press cannot be operated.

The flywheels are webbed so that there is no chance of anything getting caught in them as is possible when spokes are used. Punch-press accidents at Hawthorne are extremely low; in fact, the hazard has been practically eliminated.

Drilling Machines

Many well-designed high-production semi-automatic drilling machines are available for automobile parts and larger, but equipment for drilling small holes through comparatively thin material has undergone but little change in many years.

In the drilling of small holes at, say, 8000 r.p.m. through thin stock it often happens that, due to the nature of the work requiring the loading and unloading of jigs and other handling, the drills are cutting metal only a small portion of the time; in fact, on some jobs less than ten per cent. So far as the author is aware, there is on the market no general-purpose machine suitable for small work in which the attempt has been made to cut down appreciably the lost time due to handling. For this reason the development engineers of the Western Electric Company have suggested a design which can be built with one or more spindles as desired, and which is provided with a dial for carrying the work to the drilling position by an intermittent motion, the drills being fed to the work by means of cams. The driving and operating mechanism is entirely enclosed and adjustments are provided so that changes in speeds and feeds and the time of a drilling cycle may be varied as required.

Another type of drilling machine which is being developed is a double-opposed machine with two heads, each carrying several spindles, which can be fed to the work from opposite sides. The work is held in a turret mounted on a horizontal axis in the center of the machine. The turret is hexagonal, each side of the hexagon carrying a fixture, and rotates intermittently, locating each fixture successively in line with the drill spindles in the opposite heads. The drilling heads are moved to and from the work hydraulically, arranged with rapid approach and correct drilling speed and quick return. It is expected that this machine can be used for drilling, burring, and tapping, and also for multiple drilling when required, simply by providing multiple drilling heads to be driven by the various machine spindles.

A recent investigation of the available multiple-spindle vertical drilling machines with power feed, suitable for use on metal or wood, resulted in a decision that it would be necessary to design a machine in order that the desired operating conditions and maximum output might be obtained. Thirty-two spindles are provided, driven in groups by three vertical ball-bearing motors. The travel of the head to and from the work is accomplished hydraulically.

No user would prefer to design and build his own machine tools, and the Western Electric Company is no exception. The time spent on such work could be used to advantage on special-purpose machinery of which a large amount is required. It is found necessary to do so, however, on account of the relatively small number of different types of standard production machines available in the sizes used in the telephone-manufacturing business.

The purchase price of machinery is never the entire cost. Often the cost of installation, including guards and electrical equipment, amounts to several hundred dollars. Much of this could be saved if the machine builder would build into his machines fuse boxes, switches, light brackets, and the necessary conduits, and would provide adequate and well-designed guards. This matter has been given more attention of recent years, but it is still found necessary to buy many machines on which these important features have not been provided.

It is claimed that hydraulic feeds make possible higher cutting speeds and longer tool life; but whether or not this is true, there are advantages sufficient to justify the adoption of the hydraulic method of operation wherever possible. In the first place, the use of the hydraulic means for controlling, timing, and transmitting motion does away with the necessity of gears, cams, or screws, and the bearings and shafts on which they are mounted; consequently the maintenance by comparison would be extremely low. Another advantage is the exceptional flexibility of the system, it being possible to obtain very easily any speeds in either direction, or any variation in speed in either direction, without difficulty.

For small screw-machine work it would seem to be entirely practicable to design a vertical screw-machine unit which could be mounted singly or in multiple on a suitable frame and which would take up much less space than the usual type. A unit of this type could be designed which would have a larger output than the present types of machines. There are some German and Swiss screw machines of small sizes on the market, but there is no machine built in the United States suitable for high production smaller than a No. 00 B. & S. automatic, which, including the stock rack, occupies about twenty square feet of floor space. This should be sufficient for about six units built vertically.

Destruction Test of a 66-In. Forged Steel Penstock Pipe

By JOHN L. COX,[1] PHILADELPHIA, PA.

THE Southern California Edison Company is building a high-head hydroelectric station at Big Creek Power Plant No. 2 near Los Angeles, California. At high water level the total head above the nozzles is 2419 ft., corresponding to a water pressure of 1050 lb. per sq. in.

The penstock consists of a single line of riveted or welded pipe running from the intake to a point where the head is 1644 ft., corresponding to a pressure of 715 lb. per sq. in. Below that point it is a 66-in. line 1682 ft. long, dividing into two 48-in. lines each 80 ft. long, subdividing again into four 34-in. lines each 60 ft. long, which run to the nozzles. The total length of the penstock is 6480 ft. of direct line, not including laterals.

Owing to the high head and to some experience with brittle pipe bursting without appreciable expansion, the company's engineers specified for the higher-pressure section of the line (that above 715 lb. pressure) the use of forged-steel sections with integral

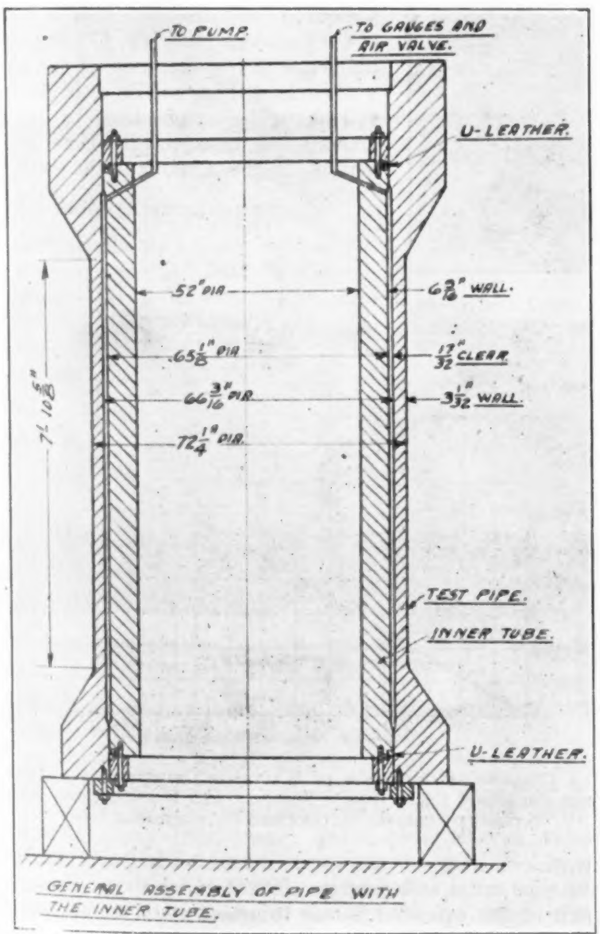

Fig. 1 General Assembly of Pipe with the Inner Tube

coupling flanges, but before contracting for this type of pipe they arranged for the manufacture of a representative section of 66-in. pipe and for its test to destruction to determine the elastic limit and ultimate strength, as well as the deformation and behavior under high pressure of this type of conduit.

The specifications for forged-steel pipe were as follows:

Tensile strength, lb. per sq. in.	62,000
Yield point, lb. per sq. in.	35,000
Elongation in 2 in., per cent	25

Each section was to be subjected for 15 min. to an internal hydrostatic pressure of twice its static working pressure. The thickness of sections was based on an allowable stress in the metal of 12,000 lb. per sq. in. under full static head, calculated by Birnie's formula for open-end cylinders with thick walls: namely,

$$P = \frac{10(D_1^2 - D_2^2)}{13D_1^2 + 7D_2^2} \times S$$

where P = internal pressure in pounds per square inch
D_1 = outside diameter in inches
D_2 = inside diameter in inches, and
S = fiber stress in pounds per square inch.

For reasons of economy the body of the test pipe was reduced in length to 8 ft., that being considered sufficiently long to avoid reinforcement of the mid-length by the end flanges—a view that later proved to be correct.

Fig. 1 shows the design adopted for this representative forging and how it was fitted with its inner cylinder. The pipe had an average internal diameter of $66^3/_{16}$ in., an average wall thickness of $3^1/_{32}$ in. over a length of $94^5/_8$ in., and a heavy flange at each end.

Manufacture

To this design a forging was made from a 63-in. octagon ingot of acid open-hearth steel of the following composition:

Carbon	0.29
Manganese	0.51
Phosphorus	0.024
Sulphur	0.042
Silicon	0.21

After reheating, the ingot was cropped, punched, expanded, and forged under a 9000-ton hydraulic press, then lightly annealed. The average physical properties obtained on transverse test bars taken from the heavy section of the ends, about 13 in. thick, gave the following results:

Tensile strength, lb. per sq. in.	67,750
Yield point, lb. per sq. in.	27,000
Proportional limit, lb. per sq. in.	24,500
Elongation in 2 in., per cent	31.2
Reduction of area, per cent	41.5

Test Arrangements

To reduce the volume of the water space at test and to simulate conditions of actual service, there was arranged to be inserted in the test pipe a thick-walled cylinder having ends closely fitting the bore of the pipe and fitted with U-leathers. A slight reduction in diameter of the inner cylinder between its fitted ends and a slight increase in diameter of the pipe between the same points, provided a small annular space for the high-pressure water.

Pressure was supplied by a motor-driven test pump with a capacity of 2 gal. per min. up to 6000 lb. pressure.

The measuring instruments provided comprised indicating and recording pressure gages ranging up to 15,000 lb., Ames dial indicators for measuring radial expansions at four points 90 deg. apart at mid-length of the pipe and read for pressures up to 2600 lb.; and electric expansion indicators, range 0 to 8 in., reading to $^1/_4$ in. These latter were applied at the same points as the Ames dials when the latter were removed, and measured the radial expansion from 2600 lb. up to the bursting pressure. There were also mechanical expansion indicators, each formed of a steel wire fastened at one end to a fixed object near the pipe, wrapped one turn around the lubricated body of the pipe and, after running over suitably arranged pulleys, suspending at the other end a counterweight with a pointer indicating on a vertical scale at its side the circumferential expansion of the pipe.

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[1] The Midvale Company.

Abridgment of a paper to be presented at the Annual Meeting, New York, December 5 to 8, 1927, of The American Society of Mechanical Engineers. The complete paper may be obtained on request.

The Test

A preliminary test under a pressure of 1800 lb. developing no leaks of the U-leathers or at the joints of the piping, the official test began at 10:20 a.m. the following day.

The system being filled and the air valve closed, pressure was gradually raised to 2600 lb., readings of the radial expansions being taken with the Ames dial indicators at pressures of 500, 750, 1000, 1250, 1500, 1600, 1700, 1800, 1900, 2000, 2100, 2200, 2300, 2350, 2400, 2500, and 2600 lb. per sq. in. As the readings were taken, two curves were plotted, each representing the average radial expansion of two diametrically opposite points on the pipe as a function of the pressure.

As at 2600 lb. pressure it was evident from both curves that the elastic limit had been certainly passed, the pump was stopped, the dial indicators removed, and the electrical indicators put in their place. The pressure was again increased. At 11:25 a.m. at 3400 lb. pressure a pipe joint leaked, requiring a relief of pressure to make repairs.

At 12:04 p.m., the pump was again started and expansions recorded up to a pressure of 4200 lb., when at 12:35 p.m. a leaking joint compelled a second interruption. Repairs were completed at 1:50 p.m., the pump was started and expansion readings taken up to 3:03 p.m., when at a pressure of 5300 lb. per sq. in. and with a loud report, the pipe burst.

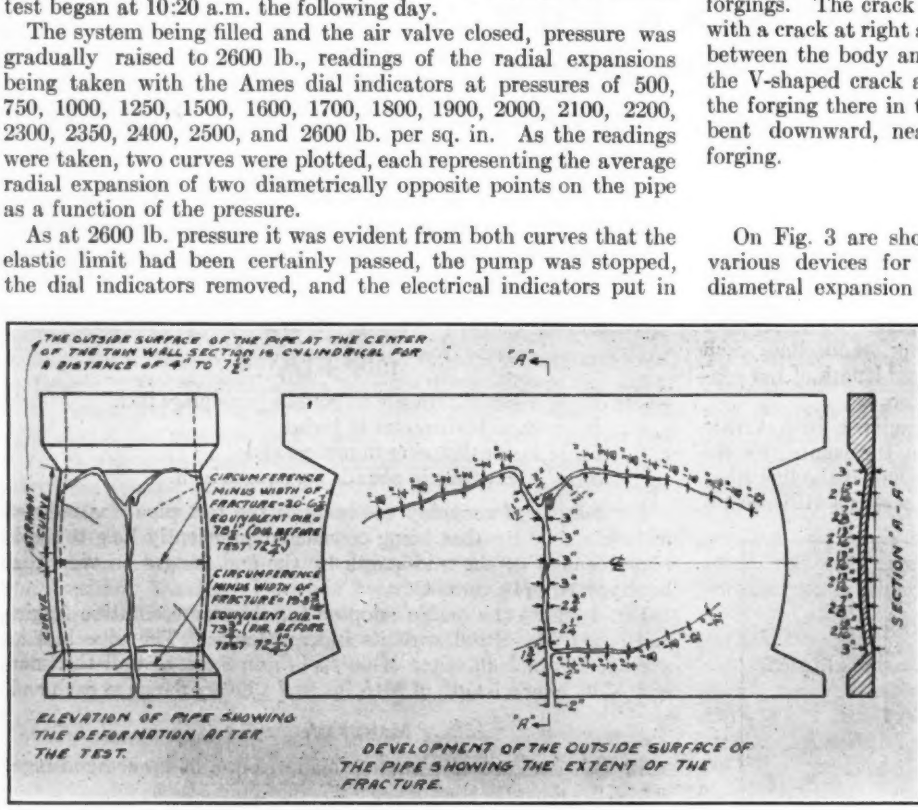

Fig. 2 Elevation of Pipe Showing (a) Deformation After Test, and (b) Development of Outside Surface of Pipe Showing Extent of Fracture

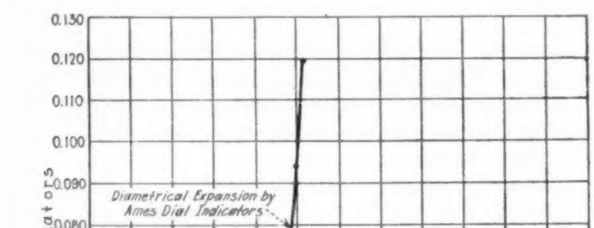

Fig. 3 Curves Plotted from Readings of the Various Devices for Measuring Expansion, and Showing Diametrical Expansion of Pipe as a Function of Pressure

Fig. 2 shows the manner in which the fracture occurred, as predicted by Dr. F. C. Langenburg, consulting metallurgist of the Watertown Arsenal, from the results of his experiments on gun forgings. The crack extended entirely through the bottom flange, with a crack at right angles to it at the point of stress concentration between the body and the bevel of the flange. The two arms of the V-shaped crack at the upper end of the pipe partly encircled the forging there in the same region of maximum stress and then bent downward, nearly meeting at the opposite side of the forging.

Results

On Fig. 3 are shown curves plotted from the readings of the various devices for measuring expansion. They represent the diametral expansion of the pipe as a function of the pressure, throughout the entire period of the test.

Fig. 4 shows the tangential stresses in the walls of the cylinder as a function of the pressure, using the Birnie formula and disregarding the limitation of the formula to stresses within the proportional limit.

According to this curve, the wall stress produced by the bursting pressure of 5300 lb. would be 62,000 lb. per sq. in. This is somewhat less than the tensile strength of the transverse-test bar, 67,750 lb. The difference shows the error of the formula when extended beyond its recognized limitations, while emphasizing by its small amount the unexpectedly close approximation of the formula to the truth.

Summary of Results

The pipe reached its elastic limit at a pressure of 2150 lb., corresponding to a tangential stress of 25,000 lb. per sq. in. in the steel of the walls, the measured proportional limit of the steel at the ends being 24,500 lb.

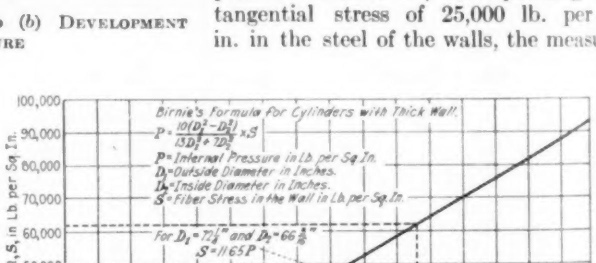

Fig. 4 Tangential Stresses in Walls of Cylinder as a Function of the Pressure, Using Birnie Formula and Disregarding Its Limitation to Stresses Within the Proportional Limit

The pipe failed at a pressure of 5300 lb. which, by the approximation of the extended Birnie formula, would correspond to a fiber stress of 62,000 lb. per sq. in., compared with an actual tensile strength of 67,750 lb.

The external expansion in diameter was 6 in., or 8.3 per cent. The internal expansion was $6^3/_8$ in. or 9.63 per cent. The mean expansion of the wall was 8.96 per cent. The reduction in wall thickness at the mid-length of the pipe at the fracture was $^3/_{16}$ in. or 6.25 per cent.

It appears that an internal pressure producing a calculated stress practically equal to the proportional limit of its metal can be withstood without permanent deformation by a seamless forged-steel pipe; and furthermore, that it may fail at about the pressure given by the Birnie formula arbitrarily extended to the ultimate strength.

A New Propeller-Type, High-Speed Windmill for Electric Generation

By E. N. FALES,[1] DAYTON, OHIO

THE generation of electricity by the wind has long been an alluring idea, which has not in the past been extensively realized because of the weight and expense of the necessary machinery. Recently, however, there has been developed a new airplane-type windmill (see Fig. 1) which, due to its improved lightness, efficiency, and cheapness, and to its higher rotative speed, can compete with gasoline farm-lighting plants.

Development of a Rational Windmill Theory

Until the present decade, data covering windmill design have been meager. Within the last few years, however, thanks to the wind-tunnel method of studying air-flow phenomena, a solid basis of windmill design has taken form, permitting the prediction of performance within a few per cent of accuracy.

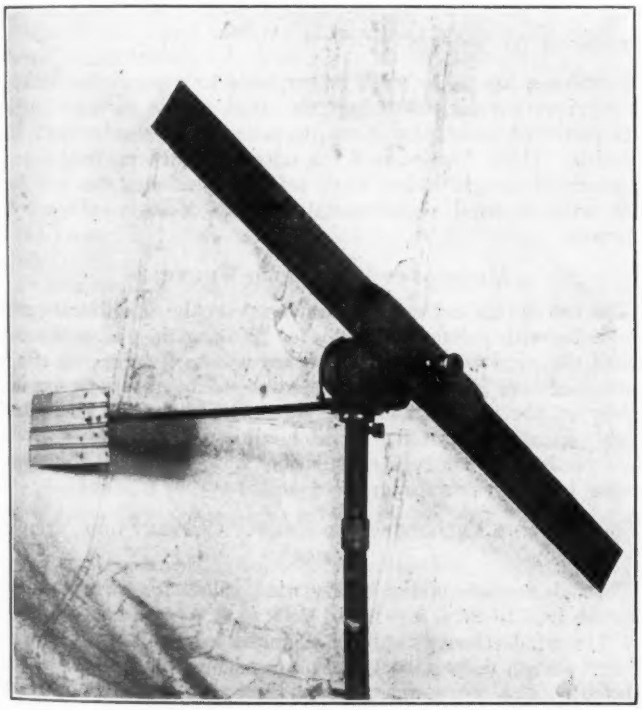

Fig. 1 High-Speed Propeller-Type Windmill Keyed on Shaft of Electric Generator Without Gearing

In the United States aircraft program of 1917, tests were carried out under the author's supervision to determine the type of windmill best suited to radio-electric-generator drive, with particular reference to speed regulation.[2] These tests showed valuable possibilities of improvement in commercial windmills.

The tests in which the aerodynamic coefficients in this paper were determined were made in the Air Service wind tunnels.

Statement of the Problem

The three types of windmills in use in the past have been (1) the so-called American or "Wind Rose" type, multibladed, with fairly large blade-angles and small diameters, rotating at low speed and having a high starting torque; (2) the Dutch type having four sails of large diameter, with higher tip-speeds, and not distinguished either for efficiency or starting torque, and (3) the vertical-axis type rotating like a Robinson cup anemometer. The third type is not to be considered here because it has an efficiency of but one-fifth that of each of the others.

The new propeller type differs from the others in its blades, which are one to four in number, of streamline cross-section, like that of an airplane propeller. The speed of revolution is from 6 to 10 times that of an American-type wheel of equal diameter in equal wind velocity.

Difference Between Pumping and Electric-Generating Windmills

The electric windmill presents a design problem different from that of the familiar multiblade farm mill. In the latter, the torque is inconstant at different points in the revolution of the wheel, and the angular acceleration is continually changing; the ratio of tip speed to wind speed is inconstant, and the angle of attack of the air striking the sails varies. The electric mill, on the other hand, has constant torque at all parts of a revolution, and the starting torque is negligible, facilitating higher design efficiency.

The Aerodynamic Method of Analysis

The best method of analyzing windmill performance is that commonly known as the Drzwiecki method, which treats each blade of the windmill or propeller as being composed of a number of airfoil elements. The air forces are calculated for successive sections of the rotating blade at increasing distances from the axis, and are integrated to secure the resultant forces on the entire blade. Fig. 2 (*a*) shows a simple velocity diagram and torque force for a section of a windmill blade and Fig. 2 (*b*) applies to propellers.

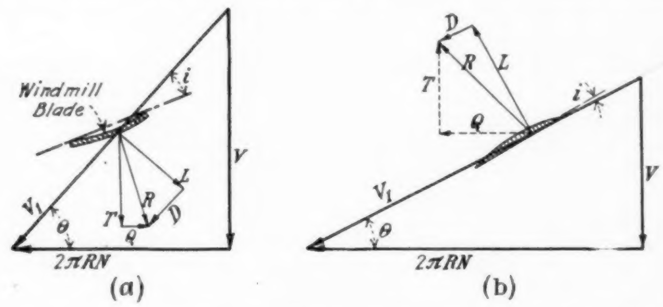

Fig. 2 Aerodynamics of (*a*) Windmill-Blade Element and (*b*) Propeller-Blade Element

(*a*) As in the propeller diagram, velocity V_1 produces on the blade a force R. The component Q produces rotation, while T produces head resistance.

(*b*) Velocity V_1 is resultant of translational velocity V and peripheral velocity $2\pi RN$. V_1 meets propeller-blade section at angle of attack i, producing resultan force R, made up of lift L (normal to V_1L) and drag D (parallel to V_1). T, the com ponent of R parallel to V, is the thrust on the blade element Q; the componen parallel to $2\pi RN$ is the torque on the blade element.

$$\left.\begin{aligned} L &= K_y A V_1^2 \\ D &= K_x A V_1^2 \end{aligned}\right\} \text{where } K_y \text{ and } K_x \text{ are coefficients determined in wind tunnel and } A \text{ is blade-element area}$$

Variables Used in Windmill Design

Fig. 2 takes account of all the variables which have in the past been so formidable to the windmill designer.

1 Diameter D is taken account of by the vector $2\pi RN$
2 Angular velocity is taken account of by the vector $2\pi RN$
3 Wind velocity V is taken account of by the vector V
4 Pitch is taken account of by the angle θ
5 Blade angle is taken account of by the angle $\alpha = (\theta - i)$
6 Angle of attack is taken account of by the angle (i)
7 Ratio $\left(\dfrac{\text{Angular Velocity}}{\text{Wind Velocity}}\right)$ is taken account of by the angle θ

[1] Aeronautical Engineer.

[2] See Airfoils for Driving Generators on Airplanes, by Maj. C. F. Gray, Mechanical Engineering, June, 1919.

Contributed by the Aeronautic Division for presentation at the Annual Meeting, New York, December 5 to 8, 1927, of The American Society of Mechanical Engineers. Greatly abridged. Complete paper available request at headquarters of the Society, 29 West 39th Street, New York, N. Y.

8 Torque force F is taken account of by the projection of R on the plane of rotation
9 Thrust T is taken account of by the projection of R on the axis of rotation
10 Blade sectional shape is taken account of by force vector R, which as a function of i is known from wind-tunnel tests on innumerable wing shapes.

In this paper the term "blade angle" is used as preferable to "pitch," and is defined as the angle between the plane of rotation and the blade chord at $^2/_3$ the radius.

The components L and D can be determined from airfoil coefficients K_y and K_x according to the equations $L = K_y A V_1^2$ and $D = K_x A V_1^2$.

Then, torque force on elementary blade area A, is

$$Q = L \sin \theta - D \cos \theta$$

and thrust, or resistance on blade area A, is

$$T = L \cos \theta + D \sin \theta$$

The coefficients differ for different airfoils and from the fundamental basis of aircraft wing and propeller design. They are determined in the wind tunnel on scale models of wings varying in size from 1 in. by 6 in. to 8 in. by 48 in., tested at velocities up to 500 miles per hour. They have supplanted the "Flat Plate Coefficients" featured in handbooks on wind pressure. By studying these characteristic coefficients we may reach immediate conclusions about the best shape for windmill blades.

Form of Blade

Cross-Sectional Contours. It is the back of the blade that does most of the work. The amount of the camber or arching to give the back of the blade depends on the purpose of the design, and may vary from 0.05 to 0.20 of the chord length. In general, greater camber gives greater resultant force, but the choice of camber will depend on the degree of interference, the blade angle, and the tip speed of the wind mill.

Blade Angle. Blade angle largely determines the r.p.m. of the wheel. The limiting tip speed of a windmill occurs at small blade angles; the resultant force on the best airfoils of which we have any knowledge will lie parallel to the windmill axis when the particular portion of the blade we are referring to is traveling about 22 times as fast as the wind. This sets the upper theoretical limits of the tip speed.

Plan Form of Blade. In the conventional American farm-type of windmill, it is usual to make the edge of the sail substantially radial. The total blade area which has in the past been recommended, $^7/_8$ or $^{15}/_{16}$ the disk area, is to be considered as a purely empirical ratio and in particular cases of windmill design may be departed from with advantage.

Starting Torque. From the standpoint of starting torque, a multiblade windmill of high blade angle is advantageous.

Resistance of Windmills

In Fig 2(a) it is the axial component of the resultant forces which causes the resistance of the windmill. It therefore does not at all follow that the resistance will be zero even in a windmill which is absolutely unloaded. The resistance of a given windmill will in general vary as the square of the velocity and the square of the diameter.

Interference

In using airfoil coefficients for windmill analysis, the question of "blade interference" must be taken account of. Interference is small for high pitch and few blades, but may be serious for low pitches and many blades.

Interference is, for windmills, an important question which Smeaton and his successors had no facilities for solving. In order to evaluate interference effect, the wind-tunnel method must be used.

Airfoil Coefficients Applicable to Windmills

Airfoil coefficients and interference data for the angles and spacing used in aircraft have been the subject of test in numerous wind tunnels, and have been essential to the aircraft designer. Since windmill sails are airfoils, the same data are applicable to windmills operating over the same range of spacing and angle of attack. For cases outside this range, as for example very high tip-speed ratios, interference data are incomplete, and we must forego use of the Drzwiecki method pending further research. But we have another method to fall back on which is even more useful: namely, test in the wind tunnel of small-scale model windmills.

It may occur to the reader that tests of this sort on small models may not apply to full-scale windmills. The objection need not be considered, however, in this case, for two reasons: (1) because wind-tunnel coefficients from the start of their usage have been held under surveillance from the standpoint of "scale effect," so that an ever-growing amount of information covering the "Law of Dynamic Similarity" has been available; (2) comparative tests of model and full-size propellers have shown that in many cases the "scale effect" is negligible.

For any diameter, velocity, and r.p.m. in a windmill geometrically similar to any model tested, the characteristics may be scaled up according to the relations—

$$\text{hp.} = C_p V^3 D^2$$
$$\text{r.p.m.} = 60 \ (V/\pi D) f$$

No evidence has been found in our tests to support the findings of previous experimenters, namely, that power varies with the first power of velocity and r.p.m. varies more slowly than the velocity. These relationships are untenable in a rational theory of windmill design. They have no doubt arisen from the fact that outdoor wind measurements are exceedingly difficult to interpret.

Methods of Regulating Windmills

The use of rudders has been universal on the small farm pump windmills, with automatic devices for swinging the mill or the sails out of the wind when the latter is excessive. In the case of aircraft windmills it was found preferable to mount the generator rigidly on the aircraft and take care of the varying wind speed (flight speed) by automatic pitch-adjusting devices. For the high-speed propeller type, regulation by "efficiency destroyer" devices has been promising.

Study of Wind Velocities and Energy Content of a Typical Year

Through analysis of the hourly wind values for 13 consecutive months, 1923 to 1924, it is found that:

1 The wind-velocity readings averaged from 6.7 m.p.h. in the calmest month (September) to 14.9 m.p.h. in the windiest month (March). The mean velocity for the year was found to be 10.12 m.p.h.

2 In each month there is a well-defined group of winds which predominate, and may be called the prevalent, or frequent, winds. The overall range of prevalent winds is 3 to 18 m.p.h.; the average range is 4 to 12 m.p.h.

There is also a well-defined group of winds which contains the bulk of the energy of each month. These are called the energy winds, and their overall velocity range is 10 to 30 m.p.h. with an average velocity range of from 13 to 24 m.p.h.

3 The energy winds possess 2 to 4 times the kw-hr. energy of the prevalent winds (averaging about 3 times as much).

4 The energy winds produce $^3/_4$ the total kw-hr. energy of a given month.

5 A windmill operating only in prevalent winds must have $1^3/_4$ to 2 times the diameter of a wheel operating in energy winds, if each is to produce the same power.

6 The prevalent winds blow 2.0 to 2.9 (average 2.5) more often than the energy wind.

7 The mean prevalent-wind velocity for any month may be estimated if the mean average hourly velocity for the month is known; the prevalent velocity is 2 m.p.h. less than the monthly velocity.

8 The energy winds blow at velocities of about 2.3 ± 0.6 times those of the prevalent winds.

9 The wind of highest kw-hr. energy has about 10 m.p.h. higher velocity than the most frequent wind.

10 For each month, the actual energy content of the wind is double the amount that would be computed from the average velocity of that month. This is due to gustiness. A steady wind, to give in a month the same power as the actual wind, would have a velocity 1.27 times the monthly average velocity of the actual wind. In designing windmills, use of the coefficients requires the assumption of a steady wind. In operation, the mill will in a month receive a certain amount of energy; a steady wind to deliver this energy would then have a certain "effective energy velocity," and the important velocity factor results:

$$\frac{\text{Effective energy velocity for the month}}{\text{Average hourly velocity for the month}} = 1.27 \pm \begin{matrix} 0.09 \\ 0.06 \end{matrix}$$

11 To use for design purposes an hour's record taken from the Robinson cup instrument the velocity reading must be multiplied by 0.9, and the corresponding kw-hr. by 0.729.

Choice of Wind-Velocity Range—Based on Calmest Month

To secure a picture of the limiting conditions of (*a*) calm and (*b*) windy operation, the calmest month of each year in the period 1918 to 1924 was selected and the average values for the 7 years faired. The windiest month was similarly analyzed and plotted. Some quite definite conclusions can be made, as follows:

1 The average velocity in the windiest month of a year is 13.2 m.p.h., $1^3/_4$ times as great as in the calmest month (7.4 m.p.h.).

2 The energy in the windiest month is about $4^1/_2$ times the energy in the calmest month.

3 The energy springs both from the velocity and "frequency," or "prevalence," of the wind. Most of the fall winds lie between 1 and 11 m.p.h.; most of the spring winds lie between 5 and 17 m.p.h.

4 Consider only the "calmest" month, since it is this which will determine the serviceability of a windmill plant. We note that while the prevalent winds lie between 1 and 11 m.p.h., being maximum at 5 m.p.h., the greater part of the energy (2.21 kw-hr. or 70 per cent) lies in the range 8 to 24 m.p.h. and has a maximum at 14 m.p.h., well beyond the prevalent winds.

5 If the 8- to 24-m.p.h. range is efficiently utilized there is small advantage in winds lower than 8 m.p.h. Thus extension of the 8 to 24 range to 6 to 24 adds only 7 per cent of the kw-hr. gained, this in spite of a notable addition (46 per cent) in the hours of operation.

6 It is interesting to note that for the windiest month the proper wind velocity is 13 to 35 m.p.h., with no great advantage in accommodating winds lower than 13 m.p.h. This range gives 9.7 kw-hr. per unit-diameter wheel during 345 hours of operation.

Comparing the kw-hr. output and hours of operation of the calm and windy month, it follows that a generator and windmill operating at full load in the calm month will be fourfold over loaded in the windy month. Any regulating device which aims to hold the power output constant throughout the year must therefore be able to spill 3 times as much energy as is normally used.

Choice of Windmill Diameter

The size of a windmill depends on the power output required at any given moment, on the monthly kw-hr. requirement, and on the velocity and frequency of the winds.

The diameter varies with the square root of the momentary power output; for example, a windmill to drive a 1-kw. generator will have a diameter 1.42 times that of a windmill to drive a $^1/_2$-kw. generator.

As for the relation between diameter and monthly kw-hr. requirement, this can be determined only by study of the wind velocity and frequency.

The choice of proper velocity can be made only after careful study of wind ranges, as previously set forth, together with practical tests and laboratory research on the relation between nominal recorded velocities and actual true velocities.

The diameter is affected indirectly by the efficiency of the storage battery or other energy-storing device.

Actually, an electric generator will run at low efficiency at low velocities and will be overloaded at the high velocities—defects which will require, as offset, a slightly larger generator and larger wheel diameter than results from calculations.

To Cut Down Battery Cost

Such a windmill would, however, actually be idle more than half the time in calm months, and would require a large, expensive storage battery to furnish the useful current unaided for periods of several days. To economize on the battery cost the "dead-wind" periods should be reduced to a minimum. This would be accomplished by ignoring the high and useful though infrequent, energy winds, and relying on the more frequent low-energy winds. For the same power at different velocities, the diameter will vary as $\frac{1}{V^{3/2}}$.

Whether or not a large-diameter, low-capacity wheel is practicable is another question, but figures show the undisputed need for large diameter if battery cost is to be minimized. While a 23.6-ft. wheel of conventional type is commercially impracticable, the propeller-type wheel which has been developed is not necessarily so, due to its lightness, cheapness, good regulation, and storm-proof quality.

Experience in quantity production of large wheels will determine whether or not they justify the saving in battery cost which is their prime *raison d'etre*.

Tying in Laboratory Coefficients with Weather Bureau Average Velocities

Knowing then that a mill of a certain diameter gives a certain power in a steady artificial wind, what is the "average hourly Weather Bureau Velocity" that will produce the same power when the same windmill is mounted outdoors? It was thought that a theoretical answer would be little better than an estimate, and an empirical solution was therefore sought as follows:

An anemometer, consisting of a small 7-in. diameter model windmill with 16 curved blades at 20 deg. blade angle, was calibrated in a 5-ft. tunnel. This instrument was held in the wind about 6-ft. to one side of the Weather Bureau anemometer. On a tape then was recorded (1) the revolutions of the anemometer, (2) seconds, and (3) each mile of wind as registered by the Weather Bureau recording apparatus.

Typical readings were taken on two different days. From the results, the following was deduced:

1 The Weather Bureau anemometer reading for an average mile was $16^1/_2$ per cent higher than the 16-blade-anemometer reading

2 Corrected by the usual Weather Bureau figure, the $16^1/_2$ per cent becomes $10^1/_2$ per cent

3 The true velocity, as recorded by the 16-blade anemometer, varied in 10 seconds from $V - 28$ per cent to $V + 28$ per cent; in 38 seconds, from V — 45 per cent to V + 45 per cent.

The effective energy velocity (E.E.V.) was $5^1/_3$ per cent higher than the mean velocity. This figure applies only to periods of time short enough ($^1/_2$ hour or so) to avoid great change of wind strength. When the period is stretched out to a month, involving wide ranges of wind strength, the $5^1/_3$ per cent becomes 27 per cent.

4 Combining the above $16^1/_2$ per cent and $5^1/_3$ per cent, it follows that an average mile of wind recording on the United States Weather Bureau instrument at Dayton a velocity of V_{wb}, will cause a windmill to perform as though in a steady wind of value 0.9 V_{wb}. The energy obtainable from the mile of wind will be $(0.9)^3 = 0.729$, the amount computed from the uncorrected Bureau velocity.

Available Energy of the Wind

Using the Froude momentum theory, the maximum energy recoverable from the wind has been determined by Betz, Munk, and Hoff, as 0.593 times the kinetic energy of motion. This maximum figure is reached when the wind after passing the windmill disk retains just $^1/_3$ its original velocity. Retardation of the wind further than $^2/_3$ results in increased impact, which however is offset by decreased volume of flow through the disk.

Improvement of this ratio by tandem wheels is impracticable. Eiffel found that at 10 meters per second a disk 30 centimeters in diameter, if too close to a similar disk upstream, experienced a negative resistance. He also found that if the rear disk was 2 diameters behind the forward disk it received no energy from the air, and the distance had to be increased to 3 diameters for the resistance to become positive. **Experiments by Crocco indicate that a disk 8 diameters behind another receives only 0.9 the normal wind velocity.**

High-Speed Indicators for Gas and Oil Engines

A PAPER dealing with this subject[1] was presented by H. M. Jacklin at the Oil and Gas Power Session of the Spring Meeting of the A.S.M.E. at White Sulphur Springs, W. Va., in May last. This paper gave particulars of a simple, rugged device for use on high-speed internal-combustion engines and air compressors, and examples of diagrams obtained by its use, and further described a multi-unit development for obtaining diagrams simultaneously from all cylinders of an engine or compressor.

Discussing Mr. Jacklin's paper, E. G. Beardsley[2] expressed the opinion that although the indicator would give comparative results, he thought no one could tell whether it would operate with small enough light to give the actual card that should be obtained. Carlton Kemper[3] stated that in his work at Langley Field he and his associates had found an R.A.F. indicator unsuitable, with two or three inherent disadvantages. He further said that the only way they could get an indicator to do what they wanted was to design one and they were attacking that problem. They would probably design an optical type in which the moving elements are very light and the time lag very short. He said that, whereas the R.A.F. indicator had a seat width which was greater than a thirty-thousandth of an inch, making a difference in pressure of 235 lb. when indicating 700 lb. per sq. in., they were using a seat width getting down to a five-thousandth of an inch.

C. T. Baker[4] said he had been told of a special high-speed indicator that the Bureau of Standards had had made for taking indicator diagrams of the closed ammonia-compression machine. This was said to be very accurate and to give information that had not been securable before. Mr. Kemper doubted if this was any different from the usual type of the United States Bureau of Standards, which, he said, had disadvantages and merely have a good composite card afterward of what the engine was doing. In response to a question, he said that they had used the Midgley indicator first, and that, while a good indicator for its purpose, it had its disadvantages, such as the light and the fact that it was difficult to get it to stand up day after day under vibration. Mr. Beardsley added that in the R.A.F. indicator there was a considerable electrical lag due to an induction coil used to puncture the paper. This did not affect the whole diagram but shifted it 3 deg.

Edgar J. Kates[5] wrote that the need of satisfactory high-speed indicators was increasing in the Diesel field because of the steady trend toward higher engine speeds. Speeds of 600 to 900 r.p.m. were becoming common in connection with engines designed for mobile applications such as locomotives, rail cars, and shovels. Professor Jacklin's indicator was therefore a most welcome contribution, and it was hoped that it would prove entirely successful. Mr. Kates was interested to know whether the exceedingly slow motion of the indicator piston and lever system, including the pencil point, caused substantial inaccuracy on account of the frictional resistance being practically static and therefore much larger than usual. The successive changes in pressure were, of course, very small, and as the pressure-recording system was practically at rest, it seemed possible that the forces involved might not be sufficient to move the leverage at each step in pressure. This would lead to the expansion line being recorded too high, and the compression line too low. Possibly the vibration of the engine itself might overcome this condition of static resistance.

The concluding sentence of the paper, he said, implied that diagrams taken with this instrument would show average conditions more nearly than an average of many single diagrams. This appeared to be true only if the load, character of fuel, etc. were kept quite constant. Suppose, for example, it took 2 minutes to make a card and the indicator was so timed that the expansion line was made during the first 30 seconds. If the load should change after one minute, the expansion and exhaust lines would not be affected because they had already been drawn, while the suction and compression lines drawn later would not show the change because they were not affected by variations in load. In a case like this it seemed probable that two single diagrams, taken at one-minute intervals, would show the actual conditions more accurately.

In response to a question by Chairman Morrison, Prof. W. T. Magruder[6] supported Mr. Kates by saying that the variation was very, very slight, so that by comparison, using the same instrument at slower speed, the variation was practically negligible. It was essential that the load and speed be kept constant, otherwise the diagram obtained would have little value. Mr. Kemper added that in his work the results were liable to vary as much as seven per cent from truth, as his company considered the indicated horsepower to be brake horsepower plus their motoring horsepower. They did not use an indicator because they had not found one that was satisfactory.

W. A. Wood[7] wrote that Mr. Jacklin had pointed out relative volumetric efficiencies of 56.5 to 65.7 per cent at one-third load and 1200 r.p.m., and showed that the maximum variation was 9.2 per cent. The average volumetric of all cylinders was 60.2 per cent at one-third load and 1200 r.p.m. He and his associates measured volumetric efficiency where they were interested in small variations. One had shown 3 per cent variation for a slight change in the engine, for all cylinders from one engine condition to another. Some of the data were one-third load at 1600 r.p.m. and the volumetric around 35.2 per cent. They had been able to check any given setting within 1 per cent. The instrument used for these tests was the same type as a gas prover used by the gas company for proving gas meters. It seemed to him hardly reasonable that any engine should show 60.2 per cent volumetric efficiency at one-third load when most good engines showed only 79 to 85 per cent at full load.

He doubted if the lower-loop diagrams of Fig. 3 were comparable with Fig. 6. It seemed that the Fig. 3 diagrams were high-pressure measurements and that the springs were too stiff to show up the characteristics of the lower loop, while the Fig. 6 diagrams were taken with low-pressure springs. He wished to know how accurate were the determinations referred to and what percentage of accuracy could be expected. He expressed the opinion that for a successful engine indicator there should be: cards at least 80 lb. per in. when measuring high pressure and 5 lb. per in. when measuring low pressure; the maximum error not greater than 2 per cent; the atmospheric-pressure line to be quickly and accurately determined when using low-pressure springs. He added that it would be very desirable if an indicator could be drawn to the low-pressure-spring scale at the same time the upper part, or high-pressure loop, was drawn.

C. F. Taylor[8] in a written discussion asked what the effect would be of varying the length of the connecting tube on the indicator cards obtained, and how the mean effective pressure calculated from the indicator cards made on the instrument agreed with the mean effective pressure computed from the brake-horsepower and friction-horsepower results.

Samuel P. Marley[9] wrote that he felt that the indicator discussed was a valuable addition to the experimental equipment of the combustion engineer. Any advance, he said, in equipment which would aid in analyzing the operation of the internal-combustion engine was very much worth while.

E. P. Culver[10] wrote that the merits of Professor Jacklin's indicator would be thoroughly appreciated by any one who had tried to indicate a modern automotive engine. The scope of useful-

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[1] Some Uses of the High-Speed Multi-Cylinder Indicator, by H. M. Jacklin. Published in MECHANICAL ENGINEERING, Mid-May, 1927, p. 543.

[2] Junior Mechanical Engineer, National Advisory Com. for Aeronautics, Langley Field, Hampton, Va.

[3] Junior Mechanical Engineer, National Advisory Com. for Aeronautics, Langley Field, Hampton, Va.

[4] Consulting Engineer, Atlanta, Ga. Assoc-Mem. A.S.M.E.

[5] Consulting Engineer, New York City. Mem. A.S.M.E.

[6] Professor of Mechanical Engineering, Ohio State University, Columbus, Ohio. Mem. A.S.M.E.

[7] Dynamics Testing Research Laboratory, General Motors Corp., Detroit, Mich.

[8] Massachusetts Institute of Technology, Cambridge, Mass.

[9] Industrial Fellow, Mellon Institute of Industrial Research, University of Pittsburgh, Pittsburgh, Pa.

[10] Assistant Professor of Mechanical Engineering, Princeton University, Princeton, N. J. Assoc-Mem. A.S.M.E.

ness, and the particular advantages of this instrument would be evident from a brief consideration of the four common types of high-speed indicators now in use: mechanical, optical, balanced-diaphragm, and "point-by-point" mechanical (or Jacklin).

The mechanical type could be made to give satisfactory diagrams at fairly high speeds, if the mass and amplitude of the moving parts were reduced to the lowest practicable limits, and their natural frequency of vibration were considerably increased. The Maihak, type 4, a well-known example of this type, was intended to give trustworthy results at speeds of 2200 r.p.m.

In the optical type the motion of the parts was exceedingly small, a long beam of light being employed to trace a magnified diagram upon a suitable screen. Its inherent ability to project upon a screen a diagram of the cycles as they occurred, strongly recommended it for use in types of research in which the variation in successive cycles was of particular interest. It was, of course, subject to the handicap that resort to photography must be made for a permanent record from which quantitative data could be secured.

In the balanced-diaphragm type the magnitude of the cylinder pressure acting upon a small steel diaphragm was determined at a particular point in the cycle by balancing against it a static gas pressure acting on the other side of the diaphragm. The condition of balance was indicated to the operator by simple electrical means, and the value of the balancing pressure could be read from test gages of appropriate range. This procedure was then repeated point by point at intervals around the cycle, giving data from which a composite diagram could be plotted. This type, developed by the Bureau of Standards, was capable of precision even at very high speeds, and was simple and rugged. In practice considerable time was required to investigate a sufficient number of points on the cycle, and the resulting record was not graphical.

The Jacklin type added very greatly to the advantages of the balanced-diaphragm by automatically and quickly producing a permanent record. The great number of points investigated along the cycle resulted in more detailed information and greater precision. The ability to indicate all the cylinders of an engine in rapid succession was a very valuable feature that was not enjoyed by the other types of instruments. It was readily adaptable to a great variety of uses, and admirably met a long-felt need of those engaged in the testing of high-speed engines.

Daniel Roesch[11] wrote that the author was obviously correct in stating that there was a very apparent need for simple, practical, high-speed indicator and had worked out a device which was of considerable value in studying cylinder performance. Its potential value as illustrated by the typical indicator cards presented was worthy of careful study by any one interested in this important branch of engine or compressor work.

It would seem an essential prerequisite that the sampling valves be placed as closely as possible to the cylinder as indicated in Fig. 8.

The statement that the resulting diagrams show average conditions more nearly than was possible by averaging many single diagrams might have more or less unimportant exception in the case of internal-combustion engines having a "float" or "roll," since this operating condition might be in time with the period required to take a complete diagram. Under certain conditions this might give pressure indications more or less than the average for various portions of the cycle.

R. F. Gagg[12] wrote that the high-speed indicator developed by Professor Jacklin had many advantages over any type of direct-connected indicator. His experience with the instrument had confirmed in general the statements in the paper. He said that in using the indicator on a Diesel engine the temperatures and pressures were somewhat higher than those generally encountered on a gasoline engine, and the tubes connecting the sampling valve to the engine needed to be completely water-jacketed. Even under this condition the indicator had to be frequently removed for cooling and recharging with fresh oil. A small amount of an exceptionally heavy grade of lubricating oil was found to give best results. This oil had to be kept cool, as when heated the solubility of air and other gases in the oil rapidly increased, and the oil was carried through the sampling valve and into the engine when pressures in the indicator decreased on the crank end of the card. It was found that the use of too much oil produced a sluggish action of the indicator which seriously altered the area of the card. For the same reason a much lighter grade of oil had to be used when measuring pressures nearly atmospheric.

Experiments with various sizes and lengths of connection tubes showed that too small or too long a tube produced a very inaccurate card, which might have as much as double the true area. The light-spring diagrams must be judged with due regard to the effect of the connection tube in producing pulsations on the diagram. It was found that the removal of the connection tubes from the cylinders produced a measurable increase in brake horsepower, due to the isolation of some air in the tube at the top of the compression stroke. This effect was of minor importance in engines not having high compression pressures. Mr. Gagg thought that the connection tube placed the only serious limitation on the usefulness of instrument.

It was found that small errors in timing the indicator with the engine produced large errors in the card area, as would be expected. The timing was checked by locating some known event on the card made under operating conditions, and also by transferring the *P-V* diagram to logarithmic paper. The indicator timing and general performance was also checked by taking cards with a known brake load on the engine, and later taking a second set of cards with no brake load, but with the same speed and other operating conditions as before. The difference in the indicated horsepower shown by the two sets of cards was then compared to the brake horsepower carried when the first set of cards were made. The results checked to within plus or minus two per cent. He considered the instrument excellent in most respects, and an improvement over former practice in that no cumbersome optical apparatus is necessary, inertia effects are minimized, and it is always ready for instant use.

Author's Closure

In his closure the author, Professor Jacklin, wrote that inasmuch as his device was in no sense an optical indicator, he was unable to understand Mr. Beardsley's comment. Mr. Kemper's experience with the R. A. F. and the Midgley had been the same as that of others with whom the author had had the privilege of talking. His experience with the Midgley was very similar to the author's which had led, partially at least, to the development of his instrument. So far as he was able to discover, his device was the only one that had ever been used in road testing, which was at the least a test of ruggedness.

Since there would always be a slight leakage of oil past the indicator piston, the frictional resistance of the latter could never be entirely static as suggested by Mr. Kates. Then, too, the impulses to the piston and pencil motion followed one another rather rapidly at speeds above 600 r.p.m. Mr. Kates' and Professor Magruder's statements about the necessity of holding the load constant were entirely correct. This need not be a particularly troublesome operation, inasmuch as it was easy to obtain a complete set of diagrams from a six-cylinder four-cycle engine running at 1200 r.p.m. in considerably less than 12 minutes.

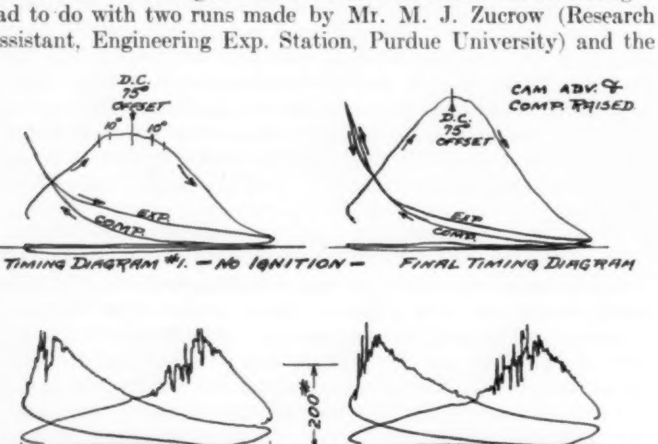
In reply to Mr. Wood, he would say that the engine from which these diagrams were taken had been run in for but one and one-half days and was probably pretty stiff. The load was set for about one-third load as observed on other engines of the same model. No attempt was made to make a complete investigation on this particular engine, as stated in the paper. The diagrams shown in Fig. 3 were obtained with a 160-lb. spring, while those in Fig. 6 were all taken with a 12-lb. spring as indicated thereon. Springs of less than 10 lb. had been found unsuitable for lower-loop diagrams, as it was always desirable to have the atmospheric line at about the middle of the diagram. Two inches was the maximum height of the complete diagram in any case. Light-spring lower-loop diagrams from another four-cylinder engine at various speeds and loads were very much like the lower part of Fig. 3, not showing the effects of pulsations as in Fig. 4. The atmospheric line was obtained very rapidly by opening a selection valve communicating with the atmosphere and turning the drum of the indicator rapidly by pulling on the indicator cord.

[11] Professor of Automotive Engineering, Armour Institute of Technology, Chicago, Ill. Mem. A.S.M.E.

[12] Assistant Diesel Engineer, Climax Engineering Co., Clinton, Iowa. Jun. A.S.M.E.

While the motoring method for obtaining the frictional losses was open to criticism, the author continued, it was probably accurate within 3 to 5 points. Fig. 9, herewith presented, showed: first, a new method for timing his device, and second, some results from his indicator in comparison with the motoring method. He believed that the use of the offset diagram for timing this device would increase its applicability manyfold. The method consisted of first setting the indicator as nearly as possible and then taking a diagram such as the first timing diagram shown in the figure. This diagram was then easily examined by placing it over a piston-position crank-angle "dummy" placed on an illuminated ground glass so that the crank-angle positions might be easily traced thereon. One could then adjust the cam coupling so that he would have a diagram like that shown as the final timing diagram in Fig. 9. In this particular case, the author was able to increase the compression pressure to about 175 lb., which gave a good peak with the 100-lb. spring which he had available. For the ordinary engine a 60-lb. spring was available, so that equally accurate results might be obtained. Some might ask why the expansion and the compression lines did not coincide for the conventional diagram. He believed that this was entirely due to the transfer of heat from and to the cylinder contents. In any event, the maximum pressure should occur at dead center, as was clearly shown on the offset diagram.

The other two diagrams and the table of results shown on Fig. 9 had to do with two runs made by Mr. M. J. Zucrow (Research Assistant, Engineering Exp. Station, Purdue University) and the



RUN No	R.P.M.	BRAKE LOAD IN-LB.	FRICTION LOAD IN-LB.	BRAKE H.P.	FRICTION H.P.	I.M.E.P.	I.H.P.	I.H.P.(B) BRAKE + FRIC.	RATIO: I.H.P. / I.H.P.(B)
1	1080	161.1		2.76		93	3.57	3.58	996
2	1110		46.3		.82				
3	1100	160.5		2.81		95.5	3.74	3.63	1.03
4	1100		47.0		.82				

ENGINE:- JACKLIN 3x4 SINGLE CYLINDER, 4 CYCLE, VARIABLE COMPRESSION FOR FUEL TESTING. OBSERVERS. H.M. JACKLIN AND M.J. ZUCROW. NOV 5 1927.

FIG. 9 TEST RUNS ON JACKLIN FUEL-TESTING PLANT

author on the Jacklin fuel-testing plant shown in Fig. 10. It was seen that the i.hp. as obtained with his instrument and by motoring varied so little as to be negligible. Three per cent was the largest variation, this being on the tests where the conditions were probably most representative, as the speed was the same for the brake and friction runs. The diagrams were each planimetered at least three times so that the areas would be accurate. The sensitiveness of the instrument was apparent in the offset diagrams where the variations from cycle to cycle were rather clearly shown for the combustion line.

The author agreed with Professor Roesch and others that the connections should be as short as possible. The multi-unit type had been designed to give simultaneous diagrams and use the short tubes. He was about to try the use of short tubes on a four-cylinder engine, using the single-unit instrument. To this end he would do away with the assembly as shown in Fig. 2 and substitute therefor a construction that would place the sampling valve within four inches of the combustion chamber for each cylinder. This would require (1) the construction of selection valves with bayonet connections close to each engine cylinder, (2) the placing of the instrument on a suitable guide paralleling a long shaft having a long keyway and carrying a sliding gear or sprocket, which shaft would always be driven by the engine. The operation for obtaining diagrams from the several cylinders would then consist of moving the whole unit from cylinder to cylinder, but probably not more than doubling the time required to obtain a set of diagrams. However, this would not be done until check runs had been made with the present installation after timing the indicator as above described.

In concluding, the author begged to acknowledge the kind remarks of the several discussers, as well as the many constructive

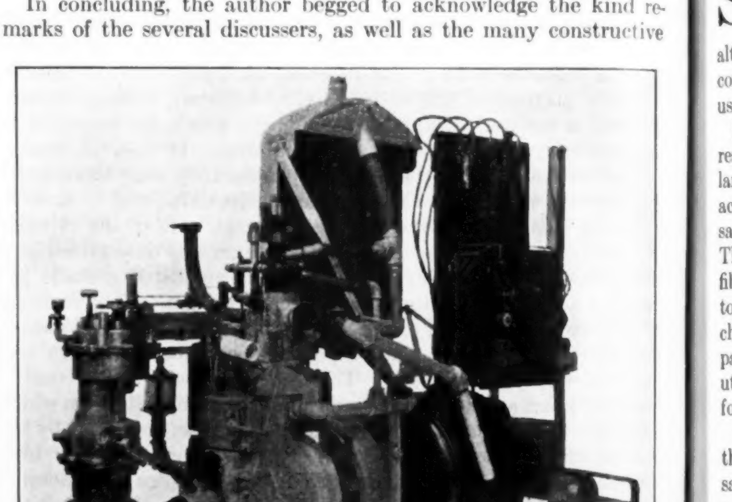


FIG. 10 JACKLIN VARIABLE-COMPRESSION FUEL-TESTING PLANT

remarks of Mr. Gagg who had used the instrument with some little success in a field in which the author had not yet had experience.

Corrosion-Resistant Copper Alloys

BECAUSE of low cost and easy workability, numerous endeavors have been made to improve the corrosion-resisting qualities of copper and its alloys by substituting nickel, either wholly or in part, for the zinc and tin of the older brasses and bronzes.

Aterite is a copper-nickel-iron alloy of variable composition, depending upon requirements, containing 10 to 40 per cent nickel, 30 to 60 per cent copper, 5 to 10 per cent iron, with 0 to 5 per cent zinc. Davis metal is of somewhat similar composition, containing less iron, but with the addition of a small proportion of manganese. Ambrac contains 20 per cent nickel, 75 per cent copper, and 5 per cent zinc. Everbrite, with 30 per cent nickel and the remainder copper contains in one analysis a small proportion of chromium. As a class, these alloys are resistant to salt solutions, caustic alkali solutions, fatty acids, sulphite solutions, dilute sulphuric and hydrochloric acids, etc. As these alloys are usually white in color, they are frequently used for household hardware, hinges, door handles, plumbing fixtures, etc., in place of nickel-plated material. They may be cast with reasonable facility, are ductile, and may be rolled into sheets, rods, wire, etc.

A very interesting copper alloy which has recently come to the front is Everdur, containing about 4 per cent silicon, 1 per cent manganese, the remainder copper. It is not serviceable under oxidizing conditions but has good resistance to dilute sulphuric acid, copper and zinc sulphates, oxalic and phosphoric acids, various organic acids, etc. One great advantage of Everdur is its high tensile strength. It casts readily in green sand and, being forgeable, may be produced in the usual forms.—W. M. Mitchell in *Industrial and Engineering Chemistry*, Nov., 1927, p. 1255.

The Steel-Wool Industry

A Brief Description of the Industry, Its Art, Extent, and Recent Development, Together with Particulars Regarding a Fully Automatic and Continuous Machine for Manufacturing Steel Wool

By CROSBY FIELD,[1] BROOKLYN, N. Y.

STEEL WOOL consists of long, silky fibers shaved from steel. A mass of such fibers, particularly when felted or padded, bears a most striking resemblance to wool, whence its name, although the method of manufacture and the fact that it has a counterpart in the wood industry tend to make the infrequently used term "steel shaving" nearly correct etymologically.

Steel wool consists, therefore, of long, relatively strong, and resilient steel shavings, of polygonal cross-section, usually triangular, but always possessing three or more sharp edges. This characteristic renders it an excellent abrasive, a strong competitor of sandpaper and similar abrasives in the woodworking industries. The fact that its cutting characteristics vary with the size of the fiber, which is readily controlled in manufacture, has enabled it to carve out for itself special markets where its supremacy is unchallenged, such as the household, and especially the kitchen, particularly for rapid cleaning of aluminum and other cooking utensils. The coarser grades are used to a large degree by painters for the preparation of their surfaces.

Metals other than steel have been manufactured into wool by the same processes as steel, and when so manufactured have the same general characteristics. Thus wool has been made from copper, lead, aluminum, bronze, brass, monel, and nickel. Metal wool, or metal shavings, must, however, be distinguished from other metal products, such as those manufactured by flattening (usually by rolling wire) into ribbons, such as tinsel, etc., which lack the sharp cutting edges. Metal wool must also be distinguished from short chips, such as are obtained from the ordinary machine-shop tools. True metal-wool fibers are quite long, usually several feet each. In the coarser grades individual fibers have been made and measured over 100,000 ft. long.

The steel-wool industry originated in Germany, where the coarser grades were manufactured for scraping wood floors. It is now centered in the United States, where eight companies manufacture approximately 3000 tons a year. Of this amount nearly 90 per cent is manufactured by three firms, who have improved their respective processes of manufacture and their products beyond the present ability of the German industry. More than half of the steel-wool production of the world is now consumed by the American housewife.

Steel wool is manufactured in nine regular grades having the same designations as sandpaper, but trade customs and requirements have caused these original grades to change. The present nomenclature is: Coarse Shavings, Medium Shavings, Fine Shavings, No. 3, No. 2, No. 1, No. 0, No. 00, No. 000. Because of the difficulty of manufacturing the finer grades, they brought a higher price, consequently in "buyers' markets" the grading became finer, and the steel-wool industry has been highly competitive for several years.

SPECIFICATIONS

The largest manufacturer has attempted to standardize upon a rational basis, with specifications as follows:

Grade A

A—*Uses.* Rubbing down varnished surfaces and other fine work where uniformity of abrasive is essential. (For rough work, cleaning of iron work preparatory to painting, etc., see Grade B.)

B—*Steel.* The steel may be bessemer, or basic, or acid open-hearth.

C—*Chemical.* One-quarter pound of the raw material after all heat and mechanical treatments and just before shaving shall be forwarded for chemical test, and any portion thereof when analyzed shall show:

	Per cent
Carbon	0.10 to 0.20
Manganese	0.50 to 1.00
Sulphur	0.020 to 0.090
Phosphorus	0.050 to 0.120
Silicon	0.001 to 0.010

D—*Physical.* One-quarter pound of the raw material after all heat and mechanical treatments and just before shaving shall be made into a proper tensile-strength-test sample, and when drawn on a standard tensile-strength testing machine shall show an ultimate strength of not less than 120,000 lb. per sq. in.

E—*Sizing.* Three 1-lb. packages of steel wool shall be selected at random from each 100 lb. of the shipment. The wool from these three packages must be free from chips and all other material not steel fibers, excepting traces of cutting compound, and appear fairly uniform to the eye, and from each shall be selected three samples taken from different parts of the package. Each of these nine samples shall contain not less than thirty individual fibers. They shall be placed between microscope slides and subjected to the following tests.

F—When viewed by reflected light under a microscope set for 50 diameters magnification, all contours shall be uniform, free from "sawteeth" or raggedness such as is obtained in lathe chips, and free from spirals or whorls. The outline shall indicate that the cross-section of each fiber has between three and six cutting edges. An allowance of 10 per cent in number of fibers displaying those defects shall be made, which, if exceeded, shall be cause for rejection.

G—These same samples shall then be placed in a magnifying projection apparatus, and the shadows magnified 50 diameters shall be examined for defects (excepting number of cutting edges) stated in Par. F. In addition, twenty shadows shall be measured across their fiber widths. care being taken to have their contours in sharp focus. The actual width of the fibers, the shadows of which have been measured with a scale graduated in one-hundreths of an inch, shall fall within the maximum and minimum sizes given in the table in Par. H. An allowance of 20 per cent on minimum and 10 per cent on maximum shall be made, which if exceeded, shall be cause for rejection. The wool shall also be rejected for the grade specified if the average of the twenty readings of any one sample shall not fall within the limits given in Par. H.

H—*Grading.*

Grade	Average	Maximum	Minimum
000	Less than 0.0018 in.	0.0020 in.	0.0005 in.
00	0.0018—0.0025 in.	0.0035 in.	0.0010 in.
0	0.0025—0.0035 in.	0.0040 in.	0.0020 in.
1	0.0035—0.0045 in.	0.0050 in.	0.0025 in.
2	0.0045—0.0055 in.	0.0060 in.	0.0030 in.
3	0.0045—0.0060 in.	0.0080 in.	0.0040 in.

Grade B

I—*Uses.* All rough cleaning and rubbing down, cleaning iron of rust preparatory to painting, etc.

J—Same as Par. B above.

K—Same as Par. C above.

L—Same as Par. D above.

M—Same as Par. E above.

N—When placed in the magnifying projection apparatus, shadows magnified 50 diameters, and measured according to the procedure outlined in Par. G above, the maximum and minimum widths shall be within the limits of Par. O below, and allowance of 25 per cent on both maximum and minimum shall be made and all other requirements of Pars. F and G waived.

O—*Grading.*

Grade	Maximum	Minimum
Fine	0.005 in.	0.001 in.
Medium	0.007 in.	0.002 in.
Coarse	0.009 in.	0.003 in.

MANUFACTURE

About 40 per cent of the United States production of steel wool is made on the Brillo-Field automatic machine and the remainder on the original shaving-block type of machine, some modifications of which have been developed to a point of considerable efficiency. All of these machines are described in more detail below, and all of them use wire as raw material. Although numerous attempts to use material other than wire have been made, no plant is at present in commercial production in the United States which does not manufacture from wire.

Wire

In order to obtain the fine, long, uniform, and strong silky fibers necessary to make real steel wool, a special kind of wire is

[1] Vice-President, Brillo Mfg. Co. Mem. A.S.M.E.

For presentation at the Annual Meeting, New York, December 5 to 8, 1927, of The American Society of Mechanical Engineers. All papers are subject to revision.

essential, which wire we have been unable to specify to sufficiently close limits by the usual statements of chemical analysis and physical properties. We know that when wire falls without the limits prescribed in Pars. C and D, satisfactory steel wool by any standard method of manufacture is unobtainable, but the converse is not assured; that is, all wire within those specifications will not guarantee good wool.

The Shaving-Block Machine

Until 1926 this was the standard commercial type of machine used throughout the United States, and was developed to a high degree of perfection with many modifications, all of which, however, retained the one basic principle of the shaving block: namely, the wire is dragged over a track which guides it, and while being dragged is shaved by a number of cutting tools hand-adjusted so as to cut the wire in passing. The simplest and possibly the earliest wire block was patented by Karl Muller, in Switzerland, Dec. 2, 1901 (Swiss Patent No. 22,589), which had all the essentials of the standard shaving-block machine in use in the United States (Fig. 1). A battery of almost replicas of this machine, but with more knives, was in operation in Massachusetts in 1923. Jakob Marti, in his

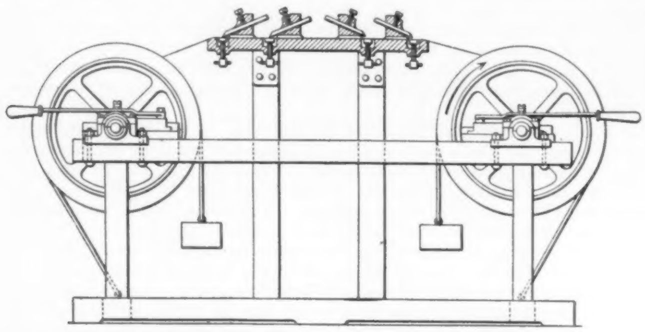


Fig. 1 Muller's Shaving-Block Machine

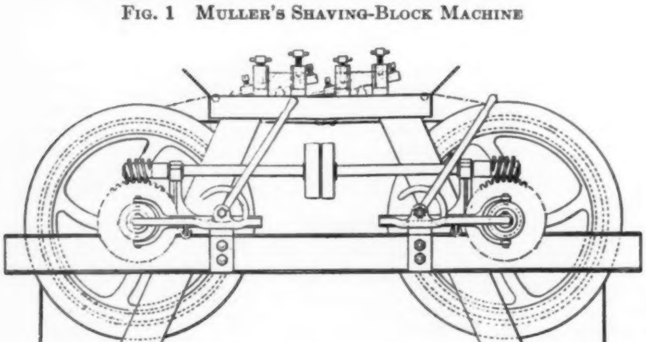


Fig. 2 Muller Machine as Improved by Marti

Swiss Patent No. 32,668, dated Feb. 1, 1905, improved Muller's machine in many details, particularly in the toolholder and the methods of constraint of the wire between the winding and the feeding drums, but seems to have missed the prime requisite of bowing the bed to sufficiently constrain the wire to produce the best wool of finer grades (Fig. 2). About the same time Max Wurzinger received a German Patent (No. 19,106, 1903) for a knifeholder construction which introduced the traversing principle.

Attention must now be directed to the United States, where although the Patent Office is silent, yet machines of the Muller-Marti type sprung up in great numbers, until in 1924 there had been built no less than 400 machines, most of which were then in operation. Fig. 3 shows some batteries of these machines in the plant having the largest steel-wool production in the world as of that date.

Although these machines were fundamentally identical, yet great ingenuity had been displayed in the design of its machines by each separate company, some of which had developed details of toolholders, wire guiding and constraint, power drive, tool profile, hardening processes, etc. to a large degree of refinement. But they all dragged a single wire over a guiding block or blocks, over which a hand-adjusted cutting tool bore. Some machines had six knives, some eight, some as high as fifteen. Some machines were extremely light, others very heavy; some had traversing knives, others swinging, others oscillating. All used the same type of knife, having a serrated edge, but the number of serrations to the inch, the profile of the cutting tooth, etc. were trade secrets,

Fig. 3 Batteries of Machines of the Muller-Marti Type

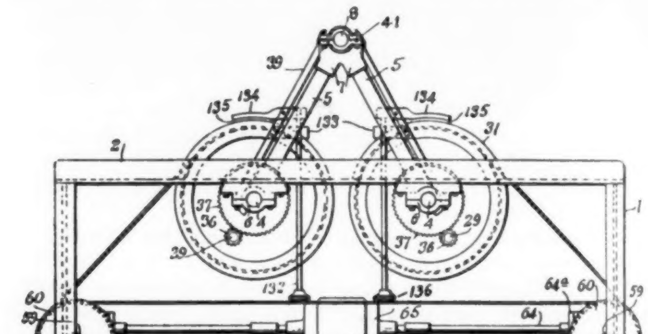


Fig. 4 Robbins' Machine for Making Steel Wool

known only to the individual company—and incidentally, quite thoroughly understood by every one else in the industry.

The amount of steel wool produced per machine hour varied, of course, with the design of the individual machine, the number of cutters, the cutting speed, the grade of wool being cut, and the uniformity and length of the wire, but a fair daily average was about 3 to 4 lb. per elapsed hour. The first attempts to increase this rate were merely additions of knives, but where local conditions permitted, the wire was returned and repassed under the same knives, which then cut upon two strands of the same wire. This change required the addition of two grooved idler pulleys, plus a number of small but difficult changes in track guides and more care in cutter preparation. This method tended to greatly decrease uniformity

of wool, and therefore was not adopted by the larger plants where quality (i.e., uniformity of grading) was considered more important. The post-war business depression started the steel-wool industry considering developments in earnest, which resulted in the United States Patent Office receiving several wire-wool-machine applications, which in due course began issuing in 1923 and have continued until the present.

A. J. Roth (U.S. 1,462,181, July 17, 1923), utilizing two entirely

Fig. 5 Battery of F.G.F. Machines Having an Average Cutting Rate of 6 to 7 Lb. per Hour

distinct wires with separate sets of feeding and winding drums, was promptly challenged by R. O. Schonitzer (U.S. 1,548,807, Aug. 4, 1925), refining the old multipass of the same wire. We have no record of the actual performance of this machine. W. H. Robbins (U.S. 1,584,145, May 11, 1926) has produced a refinement of this type (Fig. 4), in which the details are developed in many important particulars, one feature being power drive for the idlers. Several of these machines are in operation and are said to have come up to the full expectations of the inventor.

Other refinements of the Muller-Marti type of machine were made by Crosby Field (U.S. 1,608,479, Nov. 23, 1926), and Crosby Field, Alan E. Flowers, and George Francis Gray (U.S. 1,608,480). These gave constructions permitting a comparatively large number of cutters, and were the first to recognize the necessity of promptly removing the wool from the line of contact of knife with the wire, which the latter accomplished by means of an air blast. Fig. 5 shows a battery of these latter machines, called the "F.G.F." type and having an average cutting rate of about 6 to 7 lb. per hour.

The most ambitious refinement of the shaving-block type, however, was that introduced by Steinbart in 1924, which has for its aim the consumption of the usable portion of the wire in a single pass of the wire through the machine. Between 1924 and 1927 four of these machines were built. Because of interferences and other reasons unknown to the author, the U. S. patents have not yet been issued (at time of writing), but the British Patent No. 242,894 to William August Steinbart, Nov. 19, 1925, shows the essential features.

Referring to Fig. 6, this machine consists of a multiplicity of parallel shaving blocks all attached to a single supporting frame, over which multiple strands of the same single wire are dragged. These strands are separated from each other about $1^1/_2$ in., and each knife cuts upon only one strand of wire, thus varying the usual procedure with repassing wire machines (see above), where the wire strands are run close enough together so that the same knife can cut several wires simultaneously. The wire is passed and repassed about 56 times, consequently the idler rollers of the fewer number of passes have become large drums, about 4 ft. in diameter by 7 ft. long. Pulling of these drums as "idlers" is of course impossible, so both of them are power driven and intergeared so as to travel at the same peripheral speed. And finally, in order to both overcome the difficulty of the extraordinarily wide bed and to utilize for cutting purposes the return travel of the wire strands, the entire working structure has been changed from a horizontal- to a vertical-bed machine, having a total of 574 individual cutting tools or knives, placed half on each side of the machine. This upright operation also assists in the carrying of the wool away from the freshly cut wire.

Steinbart has carried the development of the Marti-Muller shaving-block type of wire-wool machine to its ultimate, and it is doubtful that any further radical changes in essential parts of this type are in store for us. The Brillo-Field machine uses wire and the same type of cutting edge, but has nothing else in common with any of the above modifications of the shaving-block type of steel-wool machines originated by Muller. Before proceeding to a detailed description of this machine, therefore, let us digress for a moment to consider other types of wool machines, none of which attained any commercial success in the United States in the production of steel wool.

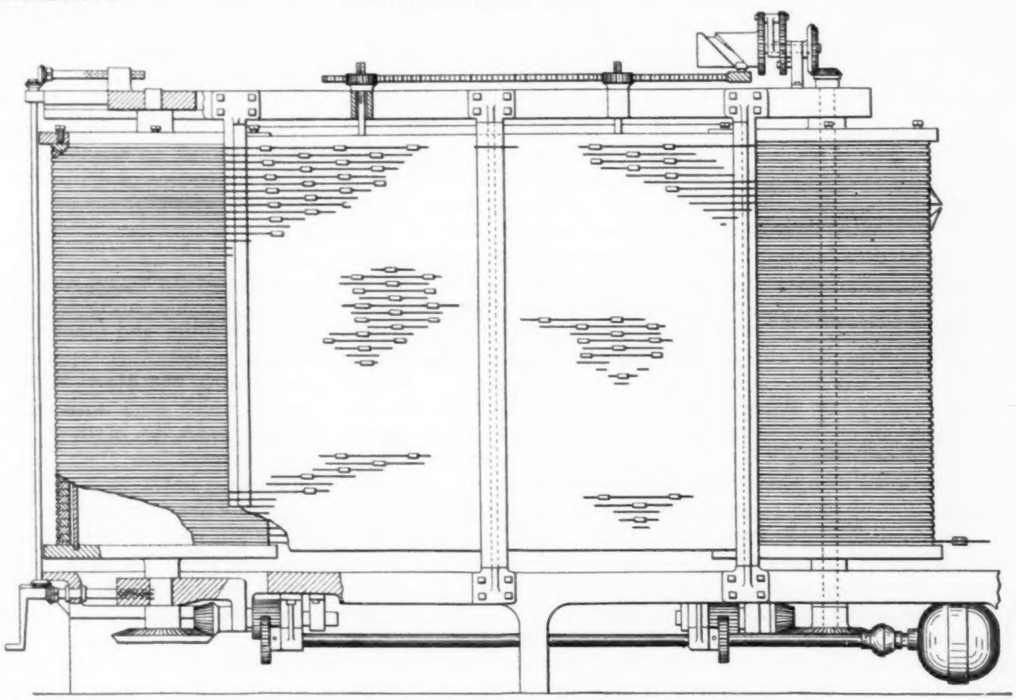


Fig. 6 Steinbart's Multiple-Strand Machine

Miscellaneous Machines

Inasmuch as none of these has attained any noticeable commercial success to date in the United States, and the information concerning foreign attempts is fragmentary and often conflicting, these miscellaneous machines will be only briefly mentioned here. The list is not intended to be complete; all known commercial United States processes either have been or will be mentioned in other parts of this article.

In wire-consuming machines, Julius Berthold (German 9378, 1901) substitutes a roller for the Marti-Muller fixed-track wire guide, and adds an ingenious circular knife mounted upon an adjustable eccentric to govern depth of cut. Henri Graf (German 147,758, 1902; U.S. 761,585, 1904) employs a combination of a rolling mill and a boring mill, whereby wire from a feed drum is led to the

vertical periphery of a revolving horizontal disk, and is held thereon by the pressure of power-driven, spring-pressed rollers, which presumably revolve at the same peripheral speed as the disk, and hence must apply a drag on the wire either at the beginning, when it is of full thickness, or at the end, when it is thin. For this and other defects the machine would seem to be impractical. George Cluck (British 21,198, 1909) details an improved construction using grooved anti-friction idlers instead of stationary tracks and a novel arrangement of knives; and Edward Wertheimer (German 44,395, 1909) also discloses a type of construction substituting rollers for the wire-guide tracks. P. J. Tabourin (French 401,519, 1909) returns to the simple shaving-block machine by providing a means of adjusting the tracks, and introduces some other details of wire control. J. Lament (Swiss 77,956, 1917) offers an improvement and F. A. Paton and H. L. Koenig (U.S. 1,300,002, April 9, 1919) combine the wire-drawing block and the Marti-Muller shaving block by substituting as the cutter a die having serrations for a smooth wire-drawing die. Victor Dore (French 523,283, 1921) drags the wire through a system of contractible shaving tools built up in a fashion somewhat similar to a threading die, and thus presumably eliminates his track difficulties.

In operating the shaving-block type of machine it soon becomes obvious that it is very difficult to control the wire, and the expedient of wrapping a length of wire many times around a drum or mandrel, fastening it to the mandrel, and then shaving the wire gave the impetus to a long line of development. J. K. Muller (Swiss 31,719, 1904; French 358,540, 1905) apparently was the first to introduce this turning-lathe type of machine, although practically simultaneously Babette Ruegg and Susanna Pfister (German 168,205, 1904; British 282, 1904) appear with an excellent-appearing machine, providing grooves to hold the wire definitely in the exact helical path of the lathe-type cutting tool. H. P. Bauman (British 14,461, 1904) also appears almost simultaneously with some details of improvement, including automatic reversing of the wire-wrapped drum and feeding of the cutting tool. Charles Garbe (British 21,950, 1907) gives us an improved type only a little later. The flair for improvement of this type of machine, however, soon disappeared, and it is not a factor today.

The constantly increasing demand for finer and finer and more uniform grades, however, created competition not only between designers of machinery but also between kinds of raw material. It was early recognized that the peculiar "hard" qualities of raw material required for fine wool could be obtained not only with cold drawing of wire, but also in other ways, such as heat treating of special high-carbon steels, and more importantly by hot and cold rolling of strips or metal sheets. C. Vanoli (German 119,351, 1900) uses an endless metal band (or wire) on a modified type of shaving block, passing it under shaving cutters continuously in one direction until it is shaved too thin to hold together. The real impetus abroad to this line of development was apparently given by F. W. Buhne (British 25,075, 1899; U.S. 662,392, 1900), who obtained "elastic shavings" from "coiled bands" by cutting in the "line of the fiber" on a lathe type of machine, but he was anticipated in the United States by Sigmund Feust (U.S. 619,076, 1899), who wound up a roll of thin sheet metal and shaved the edge, and also J. G. Ulman (U.S. 573,728, 1896) who introduced the method of piling disks on top one another and shaving their edges. Urged on by the demand for zinc shavings for use in the cyanide process of gold extraction, a Californian, A. Holtzen (U.S. 655,868, 1900) discloses further improvements, and further contributions to this type are made by Frank Stearns (U.S. 678,796, 1901); Albert C. Calkins (U.S. 784,515, 1905); T. Meyer (British 1066, 1906); R. S. Browne (U.S. 874,486, Dec. 24, 1907), and H. C. Gamage (U.S. 881,852, March 10, 1908), who does an excellent bit of work in detailed improvements; A. E. Johnson (U.S. 932,786, 1909); and F. W. Braun and O. C. Beach (U.S. 1,064,284, 1913). After a long period of silence from abroad, Paul Garnault (French 529,639, 1921) appears with improvements. N. Pederson (U.S. 1,605.371, 1926) steps off radically in his sheet-consuming machine by doing away entirely with the mandrel-and-lathe type, substituting a series of power-driven rolls in tandem, each pair of which in turn seizes the sheet as it passes through the machine and cutters between each pair of rollers, which shave the sheet as it passes.

The possibility of improving ordinary lathe or other machine-shop-tool operation so as to produce a metal chip usable for wool was early appreciated, particularly for metals other than steel. Joseph Repetti (U.S. 91,267, 1869) shaved lead wool from an ingot; Du Bois D. Parmelee (U.S. 187,303, 1877) in developing a process to eliminate rolling foil and then tearing the foil in the manufacture of metallic paints and powders, shows the now familiar serrated tool; N. N. Slayton (U.S. 205,508, 1878) in the manufacture of gold and tin wool first discloses a flexible tensioning member holding the work against the tool, and his machine is improved by J. P. Mertes (U.S. 612,593, 1898). The electric-battery electrode now opens another field for shavings, and an Englishman, J. C. Howell (U.S. 622,690, 1899), first cuts a tube for this purpose on a lathe-type machine. The metallic-packing industry requires a non-curling flat ribbon of anti-friction material, which N. M. Watson (U.S. 622,906, 1899) provides by adding a special tool to this lathe type of machine. T. P. and J. Macnab (British 26,511, 1903) show an improved zinc-cutting lathe utilizing zinc disks, and W. H. Underwood (U.S. 1,320,296, 1919) returns us to the steel-wool industry and the solid-cylinder-cutting lathe by several detailed improvements in machine and cutter. Rudolph I. Schonitzer, in addition to his Marti-Muller shaving-block improvements (see above) greatly developed the machine-shop type, cutting from both a solid cylinder and a tube (U.S. 1,419,472, and 1,419,473, 1922).

Some interesting but very unusual attempts which never came into general use in the steel-wool industry should also be mentioned. F. W. Buhne, in addition to his "coiled band" shaving (see above) also devised a method (British 21,357, 1900; U.S. 684,043, 1901) of impressing indentations into a band and afterward shaving off the bands thus left as wool. Edouard Cottard (French 417,183, 1910; British 17,524, 1913; U.S. 1,216,548, 1917) shaves the wool from rotating bars, which are automatically fed against a large number of cutters, in a machine which may be likened to a huge pencil sharpener. R. Palmer and N. H. Adams (U.S. 1,213,-896, 1917) cut shavings from rods of magnesium, etc. by feeding them against an annular cutter having serrated teeth, somewhat after the fashion of sharpening a cutting tool by holding it against a grinding wheel.

The Brillo-Field Process and Machines

Probably the easiest way to understand the reason for the various novel principles utilized in this process will be to consider briefly the difficulties and other limiting factors encountered in the operation of the other types of wire-consuming steel-wool machines, particularly the Marti-Muller shaving-block type, and its refinements which were until recently standards of the United States industry. A list of these factors will be followed by a detailed discussion of how their influence has been minimized or wholly eliminated in the Brillo-Field steel-wool process.

In any shaving machine, the production, as in any other cutting operation, depends upon the amount of material that can be continuously removed; in other words, the continued cutting at the most rapid speed along the widest line of contact of the cutting edge with the work, multiplied by the depth of cut, and that multiplied by as many cutting edges as can be kept bearing upon the work. Right at this point there enters one limiting factor not found in other cutting operations: namely, the cross-section of chip is not determined by economical operation but by the size the customer wants. That leaves the width of the cutting edge the only variable section that can be controlled. It will simplify the conception of the action at the edge if we consider each little cutting tooth, having a profile roughly that of a triangle, as being an individual cutter. The limiting factors to be considered are as follows:

a Width of knife, i.e., the number of individual teeth on one single tool holder assembly
b Width of work
c Number of knives
d Removal of the fibers of wool
e Cutting speed
f Continuity of the cutting operation.

Width of Knife. The average width of knife in the industry was about 1 in.; the work was No. 12 gage round steel wire (0.106 in. in diameter). As long as only one or two strands of wire were

shaved at one pass, the width of knife, being four or more times the width of work, was not a limiting factor. In the Brillo-Field process, however, up to twenty strands of wire are cut simultaneously by the same knife, hence an increase in the width of the knife becomes essential. This was obtained by accurate engraving of the serrations, proper selection of the tool steel and proportioning of the knife, and the best-known methods of hardening and heat treating.

Width of Work. In any shaving-block type of machine one great difficulty is to so guide the wire by means of the tracks underneath the cutters that the cuts are taken along planes parallel to each other, so that each cutter in succession shaves entirely across the section of wire left by the preceding cutter. Although theoretically a simple matter, those stresses in the wire due to its great initial resilience and the handling it receives in the operation render this quite difficult. A rough method of checking the efficiency of cutting is to count the number of individual fibers of wool produced by the knife, and compare the result with the theoretical number. Thus, in producing No. 0 steel wool from a No. 12-gage wire that has been shaved exactly half-way through, 20 fibers should be produced. The highest ever observed by the author on this type of machine was 16; and 10 to 12 is considered good practice. In the Brillo-Field machine the wire does not move through a track; instead it is so held as a loop around the wheel that it is to all practical purposes an integral part of the wheel itself, consequently there is no shifting or twisting of the wire between cutters on the same wheel; therefore it always presents parallel planes to the successive cutters.

The next way of increasing the working width of the wire is to increase its diameter. A heavier wire of the toughness required cannot be handled on the shaving-block type; the Brillo-Field wheels are designed to handle any size of commercial wire, and have handled sizes much larger than No. 12. This is accomplished by always adjusting the tensioning strain to the cross-section of the wire being cut, not to the number of cutters, and this tensioning strain is limited to that required to maintain the wire in non-slip contact with its groove so that it itself is, in effect, an integral part of the wheel (see below).

Another way is to change the cross-section of the wire from a round to a rectangular shape. In the shaving-block type the difficulties of guiding shapes other than round are enormous; in the Brillo-Field machine the incorporating of the wire into being virtually an integral part of the wheel renders this easy of accomplishment. The present-day excessive cost of shapes other than round, however, causes this variation to be used but little.

Still another way of increasing the effective width of work is to have the cutting face of the knife meet the wire at an angle other than 90 deg.; in other words, to cut the wire on a slant instead of directly across, as in the fashion of a machine-shop shear cutter. However, the necessity of keeping the cutting angle very small in order to insure a long fiber instead of a chip, and the fact that because of the serrations on the tool the clearance angle is at the best very small, limit to a very small amount the gain obtainable with this procedure.

The way that is most used, however, is to have the wire so guided as to pass under the same cutter two or more times. On the shaving block type two limits immediately appear: first, the difficulty of cutting the wire with successive cutters while dragging multiple strands over successive guides so as to maintain the longitudinal axis of the adjacent strands parallel to each other, and simultaneously maintaining the cut faces of the adjacent and successive parts of the wire parallel to each other. Obviously, incorporating the wire as an integral part of a power-driven wheel eliminates this difficulty, as has been proved in practice by numerous tests extending over several years. The second limit is that of getting sufficient power to drag many strands of the wire under several successive cutters. This limit may be extended by the introduction of power-driven idlers, or still further extended to a great degree by carrying substantially the entire amount of power required by each strand as it is being cut by each knife directly to that point. This is accomplished in the Brillo-Field machine by motorizing the wheel, and thus carrying the power from the wheel shaft radially through the body of the wheel to that part of the wire directly under the cutter. Both these limits have been so far exceeded in this machine that other factors predominate long before their effects are felt.

Instead of parallel strands of the same wire, parallel wires may be used. In this case the discussion in a preceding paragraph applies with even greater vigor; the Brillo-Field machines have been operated with two wires, but from 10 to 20 parallel strands of the same wire apparently give preferable operating conditions.

Number of Knives. In the various shaving-block-machine modifications the number of knives that could be used on a single wire was limited by two independent variables, the first depending on the thick section of a new wire, the second on the thin section of a used wire. A thick wire can naturally stand a stronger total pull than a thin wire, but it is also tougher and springier, hence is more difficult to guide uniformly when dragged over a large number of tracks. It is for this reason also that the first cuts are the coarser grades of wool, which are not affected so materially by variations in cutting conditions. This factor predominates until the wire is shaved 20 to 30 per cent of its section, after that the limit is the number of knives that can cut at any one time without increasing the pull to the point of breaking the wire. As the wire thins, therefore, this becomes less, and the number of knives less, until it is no longer economical to operate.

In the Brillo-Field Process both these limits are avoided, or at least extended way beyond the point of having any substantial effect at all. This is accomplished by a tandem arrangement of a number of properly synchronized power-driven wheels, over each of which the wire is successively looped a number of turns, and while being cut the wire is substantially an integral part of the wheel which carries it and simultaneously supplies the power to carry it past the cutter. Both the limiting factors are thus practically eliminated. All the knives necessary to cut the wire to the economical (in point of labor cost as compared with wire cost) section may be used: thus one Brillo-Field machine has been in continuous operation while 2000 cuts were being taken at 2000 points on the same wire at the same time. No coarse-grade wool need be made; the first cutters can cut the finer grades if the surface of the wire itself is not marred or scratched.

Removal of the Fibers of Wool. If the fibers of wool be not immediately removed from the cutting edge of the knife, then production is lessened not only because of the clogging of the cutting edge, but also because of crumpling of the wool already made. With single strands of wire the speed of the wire is usually sufficient to throw the fiber clear of the cutting edge, but it will fall back and foul the knife unless special means are provided to pull the wool away. On the shaving-block machine the operator pulls the wool away by hand, which naturally limits the number of knives he could otherwise take care of. Multiple strands being cut by the same cutter increase enormously the difficulties of keeping the cutter clear. In the Brillo-Field process this is accomplished by directing a jet of air across the cutting edge, which not only removes this function entirely from the attention of the operator, but also removes any dirt from the wire before it is carried to the cutter edge. In addition, this air blast cools the knife, thus permitting a higher speed.

Cutting Speed. The factors that govern cutting speed in ordinary machine-shop practice are more or less in evidence in steel-wool shaving as well. The principal ones are the cross-section of the shaving, the profile and material of the cutting tool, the machinability and uniformity of the wire, the lubricating and cooling medium used and the method of application, etc. Some of these are matters of engineering already worked out, but others such as the method of application of the liquid lubricant and coolant and the use of an air blast for additional cooling and removal of the shaving are novel and are discussed more fully below.

Continuity of the Cutting Operation. Interruptions to the cutting operation are of two general classes: Those due to accident, and those which must be scheduled due to the nature of the machine, the wire, the wool, or the labor. In the latter class fall the capacity of the reels or drums, the length of the coil or bundle of wire, the time required to reset the individual cutter after a stop, etc. In the Brillo-Field machine idle time due to stops has been reduced to less than 10 per cent of the time run; accidental stops vary greatly, but over the usual normal month are found to cause an average time loss of between 5 and 10 per cent. This has been accomplished as explained in what follows, in which it will be noted the principal reasons have been:

a Elimination of lost time to reverse the machine and reset the cutters at the end of each bundle. The wire runs continuously in one direction, and the part convertible into wool is completely consumed in one pass under the cutters

b The size of drum has been enlarged so that it will feed the machine continuously for several hours, and is filled by welding the ends of bundles together

c The floating toolholder sets the knife automatically, thus saving the great labor of hand adjustment

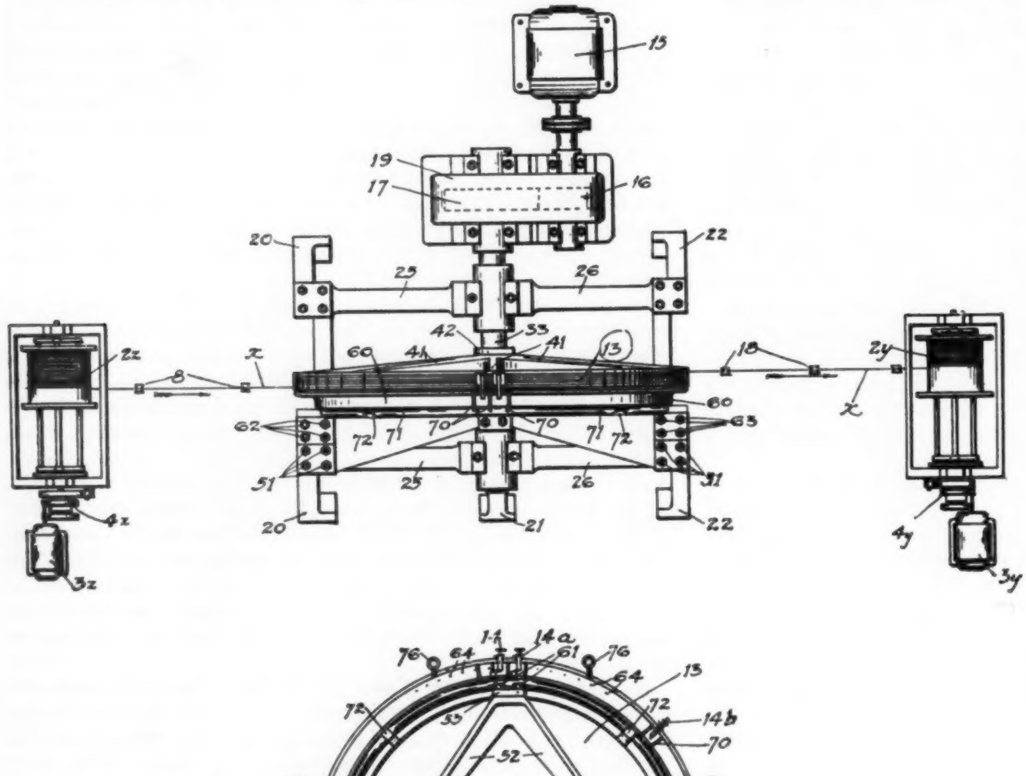


FIG. 7 PLAN AND ELEVATION OF BRILLO-FIELD SINGLE-UNIT MACHINE

d The results of accidental breaks of the wire are confined to one wheel, which can be relatively quickly restrung

e Preliminary testing of wire reduces breaks due to welds or other non-uniformity to a minimum.

DESCRIPTION OF THE BRILLO-FIELD CONTINUOUS OPERATION

A complete Brillo-Field machine consists of a number of wheels (or power-driven cutting beds) in tandem, together with means for supplying the wheels with wire to be cut and means for taking from the wheels the metal wool and the scrap wire. The number of wheels to be used in tandem for any given operation depends upon economic and design factors, there being one best number of wheels for any given set of conditions. Every number from one to ten has been operated; under present conditions of steel-wool manufacture a continuous unit of five or six wheels is preferable.

A single-unit machine is shown in Fig. 7; a photograph of a ten-unit machine is shown in Fig. 8. Both single-unit and the multi-unit plants are controlled in so far as starting, stopping, speed, and wire-tension control are concerned, from a central switchboard, and once started the control is entirely automatic until the operation is interrupted by a flaw in the material or the using up of the wire on the feed drum. Details of the control are given in a companion paper to be presented to the American Institute of Electrical Engineers.

Referring to Fig. 7, the wire coming from a feed drum is wrapped several times about the grooved wheel 13 and the grooved transfer rollers 9, 10, 11, and then is wound up on the drum $2y$. Sufficient tension is applied by the motors $3y$ and $3z$, the latter being operated as a generator, giving a dynamic breaking effect, so as to incorporate the wire as an integral part of the wheel; in other words, there is absolutely no slippage between the wire and the wheel under the cutting load involved.

Cutting is accomplished by means of serrated knives, there being a different number of serrations, a different profile of serration, a different steel, a different heat treatment, and a different cutting angle and land for each of the nine usual sizes of fiber (usually called grades of wool) on the market. The number of serrations varies from 10 to 250, the true (not the apparent) clearance angle from 3 deg. to 11 deg., and the other characteristics in proportion. These knives are clearly shown in Fig. 8, which also shows their holders. Fig. 9 gives details of construction of the toolholder. Chattering of the knives never occurs, as it is prevented by the combination of the inertia effect of the heavy weight system and the frictional dampening effect of the extra-large toolholder shaft and split bushing. This latter effect is accentuated by the use of dampening fluids for lubrication of this surface. In practice there is no chatter, the toolholder accommodating the knifeedge simultaneously to the several strands of wire. This involves a constant though slight floating movement of the toolholder, for no wheel can be maintained round to the degree of accuracy required, and the thickness of the wire is subject to change at any place along the train, as knives are replaced ahead of it.

Another characteristic of this toolholder is that, upon the knife striking a hard spot in the wire, due to segregation, slag, or other cause, the knife will "jump" out of cutting relation to the wire, permitting this hard spot to continue its travel until it encounters a knife specially designed to remove it, after which the rest of the serrated knives on the train function normally as described.

The air-blast system and the lubricating boxes for cutting oil (which are fed by a forced lubricating system) are shown in the figures. The hoods, rake conveyors for removing the wool, suction hoods for removing the oil smoke, and wool "fines" are also shown.

In closing, mention must be made of the patents already issued for the above process and machine (U.S. 1,608,478 and 1,608,479; British 268,244) and the several pending in both the United States and foreign countries. Attention should further be invited to the

opportunity afforded by this process to study the subject of machinability, particularly finishing cuts, because the machine is very accurate in its power readings, and the effects of variation of cutting

FIG. 8 VIEW OF 10-UNIT BRILLO-FIELD MACHINE

speed, cutting angle, size of chip, kind of material, etc. are very definite and selective.

The author is under a great obligation to Mr. Gerald C. Toole, to whose assistance in the vital work of development its success is greatly due, and to Messrs. Gabriel and Washburn of the E. W.

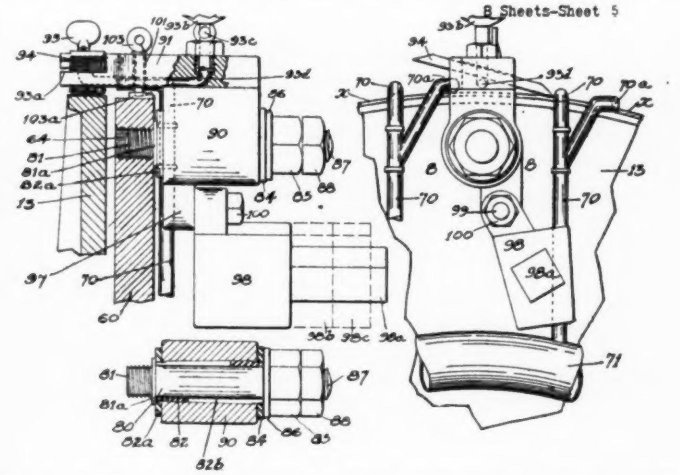


FIG. 9 DETAILS OF TOOLHOLDER OF MACHINE SHOWN IN FIGS. 7 AND 8

Bliss Co., for their splendid coöperation. Further acknowledgment is due Messrs. MacCutcheon and Gross of the Reliance Electric & Engineering Co., for their assistance on the electrical-control side.

Airplanes Made Safer

FROM information available, and particularly that published in *The Aeroplane* of October, 1927, a British aeronautical publication, it would appear that a big step toward the creation of the safe airplane has been made by the Handley Page automatically controlled slotted wing. Incidentally, it was only through some one's indiscretion that the information about this remarkable device leaked out.

The slotted wing itself has been known for several years. It provides an excellent means of controlling an airplane when flying below stalling speed. The question was how to make it work best. The original idea was to use a push-and-pull control, opening and closing the wing as the case may be. This was, however, unsatisfactory as it made the machine heavy. Then some one was struck by the idea that the so-called auxiliary airfoil or "slat" would work under stall conditions by moving forward and thus opening the slot between itself and the true leading edge of the wing. As a matter of fact, it has to do it. When the slat is pushed forward while the wing itself is held down by the tail of the machine in a stalled position, the slat becomes just an ordinary small airplane in its proper flying position. That is to say, it strives to lift. Consequently, if the slat is left hanging loose on links to flap open or shut as it likes, so long as the machine is flying with its tail up in a normal flying position, the slat, which is then a kind of false leading edge, will be pushed back against the true leading edge. As soon as the wing is stalled by shoving the tail down, the leading edge of the wing on top of which the slat is moving gets into such a position that the air flow sucks the slat up and the slot opens.

Given a slot that opens automatically, the plane is safe. When the machine is stalled the slot is already open. When it tries to roll over to one side the pilot automatically shoves the control stick over to the other side, pulls down the aileron on the lower wing, and pulls up the aileron on the upper wing. By simply connecting each slat to the corresponding aileron it will happen that as soon as the aileron is pulled up by the pilot the corresponding slot is shut, the lift of that wing is killed, the raised aileron tends to push it down, and as the other wing is still lifting as hard as it can with the slot open, the machine comes back to an even keel.

There is, therefore, a feeling among British aeronautical engineers that with the Handley Page slot and aileron control, even the worst pilot cannot get into a spin or nose dive if he stalls his machine. He may drop the machine on the ground with a bump which will push the undercarriage through the fuselage, but even then, most likely the pilot will not be killed.

In a lecture in London on safety devices Bramson quoted French statistics to show that of 100 airplane accidents 54 are due to errors of judgment and 22 to engine failure, and even these latter may be considered to be due to inability to land safely when something happens. Of those 76 fatally bad landings out of a hundred, 60 at least are fatal because in an effort to land, or in an effort to get off the ground, the pilot as well as machine either nose dives, or spins and nose dives into the ground. A device like the Handley Page slot and aileron control will eliminate the major share of these accidents.

The earlier experiments with interconnected slots and ailerons were comparative failures, because the slats were operated either with push-and-pull rods, or by being mounted on fore-and-aft plates pivoted on a long tube running inside and parallel to the leading edge of the wing. All this mechanism of R.A.E. design was very heavy, and the various joints, pulleys, bell cranks, slides, and so forth embodied in it were stiff to work. They made the machine heavy, and they made the controls heavy in the hand.

But even so, the advantage of the combined slot and aileron control is so great that the Department of Supply and Research at the Air Ministry decided to use it, simply because, thanks to the enlightened officers now in control, the fact was realized that there was more wisdom in using an imperfect mechanism which would save life than in waiting for a perfect mechanism to be evolved—which was the mistaken policy which delayed the use of parachutes for ten years and cost hundreds of lives in the war about 1917–1918.

All the complicated designs for this officially designed mechanism can now be scrapped and the old Bristols of the Army Coöperation Squadrons equipped with the automatic slot.

The Skoda Works at Pilsen, Czechoslovakia, are reported to have installed coal-washing equipment in Turkey, according to Commercial Attaché Elbert Baldwin, Prague. The first units are said to have been placed with the Société de Heraclée, and this company is now installing further units in connection with its coking plants. Further orders are said to have been placed with the Skoda Works by the Kilinki Company, although financing of this order has not yet been solved.

The Influence of Elasticity on Gear-Tooth Loads

Progress Report No. 8 of the A.S.M.E. Special Research Committee on Strength of Gear Teeth

THIS progress report is the second of a series of analyses of the test runs made on the Lewis gear-testing machine, using the various equations developed in the previous four progress reports to test their consistency, and deals with the runs made with cast-iron gears.

V TEST RUNS WITH HARDENED AND GROUND STEEL GEARS

Run E

The log of Run E (Runs E-1 to E-73, incl.) is given in Table 1. The first series (E-1 to E-11, incl.) were made with two split cast-iron pulleys attached to the pinion shaft. It was anticipated that the runs made with one of these pulleys removed would show appreciably lighter loads because of the reduction of the mass on the pinion shaft. The second series of runs (E-12 to E-19, incl.) with one of these pulleys removed, however, gave practically the same results as the first series. On reconsideration, it appeared probable that the elasticity of the pinion shaft between the pulleys and the test pinion tended to absorb the reactions of the test pinion so that but little of the effect of the mass of these pulleys was impressed upon the test pinion.

It was not deemed advisable to run the test machine with the split cast-iron pulleys much faster than the speed which would develop a pitch-line velocity of about 1000 ft. per min. These split pulleys were therefore replaced with two solid pulleys, one about 15 in. in diameter and the other about 7 in. The third series of tests (E-20 to E-34, incl.) were made with these solid pulleys on the pinion shaft. All succeeding series of tests were also made with these solid pulleys.

In order to obtain experimental data on the effect of mass, a 230-lb. flywheel was provided which was attached directly to the test pinion. At first this flywheel, which was made in two parts to facilitate handling, was bolted together and bolted to the pinion disk. The fourth series of test (E-35 to E-42, incl.) were made with this flywheel bolted to the pinion disk. This flywheel showed evidences of moving in relation to the pinion at the higher speeds, so that taper pins were employed to dowel the two parts of the flywheel together while other taper pins were used to dowel the flywheel to the pinion disk. The fifth series of tests (E-43 to E-56, incl.) were then made, which gave appreciably higher test loads at the higher speeds.

During some intermediate tests these gears, which were also used as master gears on other tests, became slightly abraded so that a chart of their accuracy showed an error of about 0.0007 in. instead of the original amount of 0.0005 in. Therefore a sixth series of tests (E-57 to E-73, incl.) were made and the test loads were appreciably greater than before.

In Table 1 are also given the acceleration loads, the amount of separation of the teeth, and the impact loads as calculated by the use of the tentative equations previously set up. Thus for the acceleration load we have:

$$f_a = \frac{f_1 \times f_2}{f_1 + f_2} \qquad \text{[II-9]}^1$$

$$f_1 = 0.0025p\left(\frac{R_1 + R_2}{R_1 \times R_2}\right)^2 mV^2 \qquad \text{[II-7]}$$

$$f_2 = f\left(\frac{e'}{d_t} + 1\right) \qquad \text{[II-8]}$$

where
- f = applied load
- f_1 = acceleration load on rigid materials
- f_2 = load required to deform tooth amount of effective error
- f_a = acceleration load in pounds
- p = circular pitch of gears in inches
- R_1, R_2 = pitch radii of test gears in inches
- m = effective mass
- V = pitch-line velocity in feet per minute
- e' = actual tooth error in inches
- d_t = static deformation of tooth profile at pitch line in inches

$$d_t = f\left(\frac{E_1z_1 + E_2z_2}{E_1z_1 \times E_2z_2}\right) \qquad \text{[I-26]}$$

$$z = \frac{1}{0.242/y + 7.25} \qquad \text{[I-25]}$$

where
- E_1, E_2 = modulus of elasticity of materials
- z_1, z_2 = elasticity form factors of gear teeth, and
- y = Lewis tooth form factor.

[1] Form of notation used to refer to Equation [9] of Section II.

TABLE 1 LOG OF RUN E AND CALCULATED DATA

Run No.	V	f	f_a	k	F
	With Two Split Cast-Iron Pulleys on Pinion Shaft				
E- 1	303	46	36.5	0.000383	286.9
E- 2	413	58	60.2	0.000481	361.3
E- 3	469	69	73.6	0.000487	402.8
E- 4	533	73	89.7	0.000556	439.2
E- 5	533	96	89.9	0.000411	462.7
E- 6	651	121	120.3	0.000422	541.4
E- 7	735	130	142.1	0.000457	583.3
E- 8	855	148	177.0	0.000480	645.4
E- 9	891	157	183.9	0.000468	665.1
E-10	986	192	210.3	0.000415	730.6
E-11	1127	211	248.7	0.000430	782.8
	With One Split Cast-Iron Pulley Removed				
E-12	294	46	34.2	0.000349	276.6
E-13	372	54	51.1	0.000441	334.2
E-14	411	75	60.1	0.000362	377.9
E-15	520	100	86.6	0.000378	460.4
E-16	644	127	118.5	0.000392	544.3
E-17	785	150	155.7	0.000421	622.5
E-18	1005	163	213.9	0.000516	705.1
E-19	1107	169	240.7	0.000551	738.5
	With Solid Pulleys on Pinion Shaft				
E-20	523	84	87.0	0.000463	445.5
E-21	613	115	110.4	0.000410	518.8
E-22	628	127	114.4	0.000378	537.6
E-23	685	142	129.2	0.000373	576.4
E-24	750	142	146.4	0.000423	601.1
E-25	857	153	174.9	0.000460	649.9
E-26	945	167	198.4	0.000467	692.2
E-27	1069	192	232.1	0.000456	753.0
E-28	1191	222	266.1	0.000429	815.2
E-29	1336	257	307.1	0.000400	884.1
E-30	1532	307	361.5	0.000358	972.6
E-31	1590	337	380.9	0.000323	1015.0
E-32	1686	383	411.7	0.000277	1079.3
E-33	1834	395	451.9	0.000285	1111.5
E-34	1963	395	485.4	0.000301	1125.4
	With 230-Lb. Flywheel Bolted to Pinion Disk				
E-35	550	145	137.7	0.000388	591.7
E-36	627	186	172.8	0.000365	705.9
E-37	700	218	207.8	0.000345	753.0
E-38	750	243	232.7	0.000332	804.3
E-39	855	322	289.0	0.000266	934.8
E-40	1080	335	401.2	0.000342	1024.8
E-41	1200	403	467.9	0.000282	1126.0
E-42	1850	456	742.0	0.000290	1248.5
	With 230-Lb. Flywheel Doweled to Pinion Disk				
E-43	184	23	17.7	0.000373	189.6
E-44	254	38	33.1	0.000414	264.7
E-45	291	64	42.9	0.000306	321.4
E-46	396	75	76.3	0.000470	417.8
E-47	440	117	92.9	0.000332	487.2
E-48	557	128	140.3	0.000459	578.4
E-49	610	164	164.4	0.000398	647.8
E-50	673	196	194.2	0.000373	740.1
E-51	754	258	235.4	0.000307	822.0
E-52	1110	330	414.8	0.000360	1027.0
E-53	1335	362	521.4	0.000370	1107.7
E-54	1430	440	579.0	0.000279	1203.8
E-55	1565	505	651.4	0.000221	1285.7
E-56	1785	537	746.5	0.000199	1329.1
	Without Flywheel Attached to Pinion Disk (After teeth were abraded, error measured 0.0007 in.)				
E-57	579	148	104.8	0.000426	619.2
E-58	668	160	129.4	0.000484	680.5
E-59	684	167	133.8	0.000475	695.9
E-60	746	177	151.5	0.000503	737.2
E-61	850	209	182.5	0.000495	818.9
E-62	974	235	219.6	0.000516	898.4
E-63	1087	322	255.7	0.000391	1031.4
E-64	1210	365	300.2	0.000383	1124.6
E-65	1490	400	384.9	0.000431	1240.8
E-66	1630	452	433.1	0.000398	1332.5
E-67	1672	487	448.9	0.000361	1378.7
E-68	1695	505	457.6	0.000345	1403.9
E-69	1730	522	470.9	0.000333	1429.8
E-70	1752	557	480.7	0.000298	1472.2
E-71	1790	626	498.7	0.000235	1552.5
E-72	1930	653	554.3	0.000240	1614.2
E-73	2085	670	604.8	0.000249	1658.9

In this example we have the following:

$$\begin{aligned}
f &= \text{test load}\\
p &= 1.0472\\
R_1 &= 3.000\\
R_2 &= 8.000\\
m &= \text{values from Tables 2 and 3 in Report No. 7}\\
V &= \text{test velocity}\\
e' &= 0.0005 \quad \text{(E-1 to E-42, incl.)}\\
e' &= 0.0007 \quad \text{(E-43 to E-73, incl.)}\\
E_1, E_2 &= 30{,}000{,}000\\
y &= 0.110\\
z_1, z_2 &= 0.10582.
\end{aligned}$$

Whence

$$\begin{aligned}
d_t &= 0.00000063f\\
f_1 &= 0.00055mV^2\\
f_2 &= 794 + f \quad \text{(E-1 to E-42, incl.)}\\
f_2 &= 1111 + f \quad \text{(E-43 to E-73, incl.)}
\end{aligned}$$

Equation [II-13] for the amount of separation was deduced from a study of one rigid and one elastic body. Upon further study it is apparent that this equation does not hold quite true when both bodies are elastic. The following equation, which will give a somewhat closer measure of the truth, will therefore be used:

$$k = \frac{f_a}{f}e' - \left[\left(\frac{f_a}{f}\right)^2 + 1\right]\frac{d_t}{2} \qquad [1]$$

where k = amount of separation in inches.

For the impact loads we have:

$$F = f\left(1 + \sqrt{1 + \frac{2k}{d_t}}\right) \qquad \text{[III-8]}$$

where F = impact load in pounds.

The values of k, or the amount of separation, as given in Table 1 are remarkably consistent, varying from about 0.0005 in. at the lower speeds to about 0.00025 in. at a pitch-line velocity of 2000 ft. per min. This reduction in the value of k as the speed increases might be expected, as the voltage of the current reduces with increase of speed.

The consistency of the data in Table 1, however, is not conclusive proof by itself of the validity of the deductions thus far made. If the test data on other hardened and ground steel gears of the same tooth form but with different errors show this same consistency, it should be fair to assume that our analysis is reasonably close to the truth. We shall therefore examine these other data in detail, starting with Run A.

Run A

Test pinion 3–18–8
Test gear 3–48–2
Hardened and ground steel gears
Pinion made with a normal pitch error of +0.002 in.
Measured error .... 0.0025 in.

After the original run with these gears had been completed, the bolts on the outboard support on the testing machine were found to be loose so that this run was repeated as Run C. The data for both Runs A and C are therefore given together in Table 2.

The effective mass is calculated by the equations given in the previous progress report, as follows:

$$e = e' - \frac{d_t}{2} \qquad \text{[II-4]}$$

where e = effective error, and
e' = actual error.

$$\begin{aligned}
A &= 0.00055m_aV^2\\
B &= 0.00055m_aV^2(m_p + m_2) + zFem_2\\
C &= zFem_am_2
\end{aligned}$$

$$m_b = \frac{\sqrt{B^2 + 4AC} - B}{2A} \qquad \text{[IV-17]}$$

where m_a = effective mass of solid pulley = 19.25
m_p = effective mass of pinion blank = 0.50
m_2 = effective mass of test gear = 1.00
zF = 1,237,000

$$m_1 = m_b + m_p \qquad \text{[IV-13]}$$

$$m = \frac{m_1 \times m_2}{m_1 + m_2} \qquad \text{[IV-18]}$$

The calculated values of the effective mass m are given in Table 2.

TABLE 2 LOGS OF RUNS A AND C AND CALCULATED DATA

Run No.	V	f	m	f_a	k	F
	With Two Split Cast-Iron Pulleys					
A- 1	299	146	0.864	42.0	0.000670	722.1
A- 2	342	194	0.850	54.0	0.000630	846.4
A- 3	375	240	0.839	63.9	0.000585	949.4
A- 4	413	295	0.827	76.2	0.000553	1072.6
A- 5	534	326	0.791	120.6	0.000808	1296.5
A- 6	594	374	0.773	145.0	0.000834	1437.3
A- 7	655	502	0.756	171.5	0.000678	1656.6
A- 8	793	667	0.719	236.0	0.000648	2014.3
A- 9	1022	851	0.664	353.5	0.000724	2488.3
A-10	746	529	0.731	213.4	0.000650	1930.4
A-11	941	669	0.676	307.4	0.000938	2231.1
A-12	959	728	0.680	320.5	0.000871	2323.0
A-13	978	792	0.674	330.0	0.000749	2376.0
A-14	288	119	0.867	39.2	0.000781	675.0
A-15	524	311	0.794	116.6	0.000827	1266.4
	With Two Split Cast-Iron Pulleys					
C- 1	277	165	0.869	36.3	0.000496	700.8
C- 2	296	174	0.865	41.3	0.000535	744.7
C- 3	362	205	0.843	59.9	0.000660	891.8
C- 4	402	226	0.831	72.6	0.000724	981.3
C- 5	457	255	0.814	91.5	0.000806	1101.9
C- 6	520	297	0.795	115.0	0.000861	1245.6
C- 7	582	412	0.776	140.0	0.000704	1456.0
C- 8	712	529	0.740	197.3	0.000742	1764.2
C- 9	755	558	0.729	217.6	0.000772	1853.7
C-10	861	634	0.703	269.8	0.000828	2072.5
C-11	882	694	0.697	280.3	0.000755	2158.3
C-12	914	725	0.690	297.0	0.000757	2230.1
C-13	934	912	0.683	307.1	0.000522	2443.2
C-14	1060	912	0.656	374.3	0.000690	2593.7

The values for the acceleration loads, amounts of separation, and impact loads are determined as before and are also given in Table 2.

The amounts of separation in this case appear to be greater than on Run E. With the larger errors the gears are much noisier in operation, which makes it much more difficult to detect breaks in the electrical circuit through the telephone receivers. This is one possible reason for the calculated increase in the amounts of separation. Before attempting to draw any further conclusions, however, we shall first examine the data of the other runs.

Run B

Test pinion 3-18-7
Test gear 3-48-2
Hardened and ground steel gears
Pinion made with a normal pitch error of —0.002 in.
Measured error .... 0.0015 in.

The first series of runs (B-1 to B-11, incl.) were made with the two split cast-iron pulleys attached to the pinion shaft. The second series (B-12 to B-25, incl.) were made with the solid pulleys on the pinion shaft and with the 230-lb. flywheel doweled to the pinion disk. The log of this run is given in Table 3, together with the calculated values of the effective masses, acceleration loads, amounts of separation, and impact loads.

Run D

Test pinion 3-18-4
Test gear 3-48-2
Hardened and ground steel gears
Pinion made with spacing error of 0.002 in.
Measured error .... 0.0021 in.

The first series of runs (D-1 to D-13, incl.) were made with the two split cast-iron pulleys attached to the pinion shaft. The second series (D-14 to D-19, incl.) were made with the solid pulleys on the pinion shaft. The log of this run, together with the calculated values of the effective masses, acceleration loads, amounts of separation, and impact loads, is given in Table 4.

Run F

Test pinion 3-18-3
Test gear 3-48-2
Hardened and ground steel gears
Pinion made with spacing error of 0.0005 in.
Measured error .... 0.0008 in.

TABLE 3 LOG OF RUN B AND CALCULATED DATA

Run No.	V	f	m	f_a	k	F
	With Two Split Cast-Iron Pulleys					
B- 1	296	169	0.836	39.4	0.000294	591.2
B- 2	337	222	0.818	50.0	0.000264	707.3
B- 3	465	259	0.771	88.9	0.000424	903.9
B- 4	529	316	0.748	110.3	0.000412	1032.4
B- 5	696	367	0.695	173.3	0.000567	1258.4
B- 6	735	406	0.683	189.2	0.000543	1336.1
B- 7	835	429	0.655	230.4	0.000631	1450.4
B- 8	864	479	0.647	243.4	0.000572	1527.5
B- 9	914	521	0.634	264.5	0.000555	1611.5
B-10	891	560	0.638	254.8	0.000470	1631.3
B-11	927	560	0.630	270.6	0.000507	1661.5
	With Solid Pulleys and Flywheel Attached to Pinion Disk					
B-12	172	138	0.972	15.9	0.000129	412.9
B-13	206	178	0.971	22.8	0.000135	506.8
B-14	228	227	0.971	27.7	0.000110	588.8
B-15	258	258	0.971	35.5	0.000124	668.5
B-16	296	313	0.970	46.2	0.000121	780.3
B-17	332	378	0.970	57.7	0.000107	898.9
B-18	375	418	0.970	73.0	0.000126	1003.2
B-19	416	503	0.970	89.1	0.000102	1147.3
B-20	476	563	0.970	116.2	0.000125	1299.4
B-21	520	613	0.970	137.4	0.000133	1409.9
B-22	540	663	0.970	148.4	0.000116	1491.1
B-23	558	723	0.970	157.6	0.000088	1575.4
B-24	585	768	0.970	172.9	0.000083	1657.3
B-25	666	828	0.970	220.7	0.000120	1828.2
	With Solid Pulleys and Without Flywheel Attached to Pinion					
B-26	575	356	0.732	126.8	0.000408	1122.8
B-27	835	397	0.655	230.2	0.000703	1418.5
B-28	970	438	0.623	289.0	0.000792	1575.0
B-29	1050	574	0.602	324.9	0.000610	1773.7
B-30	1160	660	0.578	375.2	0.000578	1943.0
B-31	2080	740	0.459	808.9	0.001128	2528.6
B-32	2000	717	0.467	771.3	0.001126	2470.8

The first series of runs (F-1 to F-10, incl.) were made with the two split cast-iron pulleys on the pinion shaft. The second series (F-11 to F-20, incl.) were made with the solid pulleys on the pinion shaft. The log of this run is given in Table 5, together with the calculated values of the effective masses, acceleration loads, amounts of separation, and impact loads.

Run G

Test pinion 3–18–6
Test gear 3–48–2
Hardened and ground steel gears
Pinion made with a normal pitch error of +0.0005 in.
Measured error .... 0.0012 in.

This series of runs (G-1 to G-10, incl.) were made with the two split cast-iron pulleys attached to the pinion shaft. The log of this run is given in Table 6, together with the calculated values of the effective masses, acceleration loads, amounts of separation, and impact loads.

Run H

Test pinion 3–18–5
Test gear 3–48–2
Hardened and ground steel gears
Pinion made with a normal pitch error of —0.0005 in.
Measured error .... 0.0008 in.

The first series of runs (H-1 to H-12, incl.) were made with the two split cast-iron pulleys attached to the pinion shaft. The second series (H-13 to H-17, incl.) were made with the solid pulleys on the pinion shaft. The log of this run is given in Table 7, together with the calculated values of the effective masses, acceleration loads, amounts of separation, and impact loads.

Summary

An examination of the tables will show a reasonable consistency in the amounts of separation on all runs. It has been pointed out that the larger the error that existed on the gear-tooth profiles, the noisier they were in operation, and the more difficult it was to obtain satisfactory indications of a break in the telephone receivers. With a light load, the breaks were nearly continuous. The attempt was made in the tests to increase this load until only an occasional break was heard. As the load increased and the breaks became fewer, they also became more indistinct. The most satisfactory run was the Run E, because of the quietness of the gears in operation and the greater distinctness of the breaks. In addition, the testing machine has a series of very pronounced critical speeds where it was almost impossible to get satisfactory readings on any of the gears.

TABLE 4 LOG OF RUN D AND CALCULATED DATA

Run No.	V	f	m	f_a	k	F
	With Two Split Cast-Iron Pulleys on Pinion Shaft					
D- 1	289	157	0.858	38.6	0.000464	662.9
D- 2	375	222	0.828	62.9	0.000518	861.6
D- 3	414	251	0.815	75.4	0.000544	951.5
D- 4	461	345	0.799	90.7	0.000435	1113.3
D- 5	524	404	0.779	114.3	0.000456	1265.7
D- 6	585	460	0.760	137.8	0.000470	1404.8
D- 7	648	508	0.741	163.7	0.000500	1539.2
D- 8	724	577	0.719	196.6	0.000513	1704.5
D- 9	798	640	0.699	230.7	0.000529	1857.9
D-10	911	674	0.672	285.1	0.000638	2022.0
D-11	934	700	0.666	296.4	0.000629	2073.4
D-12	970	744	0.657	313.8	0.000610	2155.4
D-13	1034	778	0.643	346.9	0.000643	2258.5
	With Solid Pulleys on Pinion Shaft					
D-14	557	422	0.768	126.6	0.000485	1331.8
D-15	644	472	0.743	161.8	0.000554	1497.7
D-16	715	544	0.722	192.9	0.000551	1660.3
D-17	785	586	0.703	224.3	0.000592	1788.5
D-18	895	683	0.675	276.5	0.000600	2012.8
D-19	1000	725	0.651	328.9	0.000677	2167.8

TABLE 5 LOG OF RUN F AND CALCULATED DATA

Run No.	V	f	m	f_a	k	F
	With Two Split Cast-Iron Pulleys on Pinion Shaft					
F- 1	285	69	0.800	35.0	0.000378	364.9
F- 2	399	84	0.746	62.0	0.000550	476.0
F- 3	459	94	0.719	78.2	0.000615	532.6
F- 4	521	123	0.677	94.2	0.000551	602.8
F- 5	580	184	0.668	114.2	0.000416	710.2
F- 6	888	220	0.574	213.3	0.000641	924.4
F- 7	1026	253	0.541	259.6	0.000657	1022.1
F- 8	1039	259	0.539	264.6	0.000651	1035.2
F- 9	1079	268	0.530	278.4	0.000656	1061.5
F-10	1132	293	0.519	296.5	0.000623	1108.7
	With Solid Pulleys on Pinion Shaft					
F-11	570	146	0.674	110.6	0.000534	664.4
F-12	1000	177	0.550	250.5	0.000965	934.4
F-13	1115	228	0.525	289.6	0.000828	1035.1
F-14	1250	260	0.500	336.7	0.000814	1120.1
F-15	1390	291	0.479	383.8	0.000804	1246.1
F-16	1570	322	0.456	445.7	0.000812	1288.0
F-17	1630	343	0.450	467.3	0.000781	1326.4
F-18	1715	465	0.437	502.3	0.000547	1476.4
F-19	1790	506	0.430	531.2	0.000505	1539.3
F-20	1935	548	0.418	584.3	0.000484	1616.1

TABLE 6 LOG OF RUN G AND CALCULATED DATA

Run No.	V	f	m	f_a	k	F
	With Two Split Cast-Iron Pulleys on Pinion Shaft					
G- 1	294	92	0.840	39.2	0.000477	475.6
G- 2	342	125	0.803	50.7	0.000441	561.6
G- 3	379	142	0.787	60.2	0.000456	475.0
G- 4	467	173	0.752	86.3	0.000531	739.9
G- 5	529	234	0.728	106.4	0.000457	861.8
G- 6	593	257	0.706	128.8	0.000500	945.8
G- 7	744	268	0.659	184.0	0.000700	1084.9
G- 8	811	330	0.638	209.4	0.000616	1198.2
G- 8	894	406	0.615	241.8	0.000541	1334.5
G-10	1117	472	0.564	332.8	0.000624	1548.2

TABLE 7 LOG OF RUN H AND CALCULATED DATA

Run No.	V	f	m	f_a	k	F
	With Two Split Cast-Iron Pulleys on Pinion Shaft					
H- 1	292	67	0.797	36.0	0.000403	367.3
H- 2	415	88	0.733	69.3	0.000585	501.7
H- 3	473	117	0.712	82.7	0.000510	570.5
H- 4	534	132	0.688	100.3	0.000542	627.5
H- 5	597	165	0.663	119.2	0.000499	702.2
H- 6	739	169	0.617	163.9	0.000673	793.1
H- 7	803	188	0.598	185.1	0.000671	848.1
H- 8	931	207	0.564	227.5	0.000735	932.1
H- 9	963	242	0.556	239.1	0.000640	984.0
H-10	1005	259	0.545	252.9	0.000622	1019.4
H-11	1052	276	0.535	269.2	0.000611	1058.2
H-12	1127	295	0.520	294.6	0.000613	1107.7
	With Solid Pulleys on Pinion Shaft					
H-13	592	144	0.666	117.4	0.000577	677.4
H-14	1110	203	0.527	287.4	0.000940	1007.3
H-15	1470	262	0.470	409.6	0.000966	1195.8
H-16	1785	378	0.434	520.6	0.000757	1403.5
H-17	2035	441	0.414	607.9	0.000700	1525.0

With 3 D.P. gears the most serious critical speed was at a pitch-line velocity of about 600 feet per minute.

The breaks were also harder to detect as the speed was increased, due in part to the greater noise of the gears in operation. The amount of variation in the tabulated values for the separation is well within the probable variation of this factor in the actual tests.

This does not mean that any claim is made that the accuracy of this method has been fully proved. Thus far it proves to be a consistent method, in so far as the qualitative results are concerned. Further tests are required to prove its quantitative accuracy.

Before attempting to prove its quantitative qualities, we shall examine, in a similar manner as before, the results of tests on gears of different materials and tooth forms. The next progress report will deal with the tests on cast-iron gears and pinions.

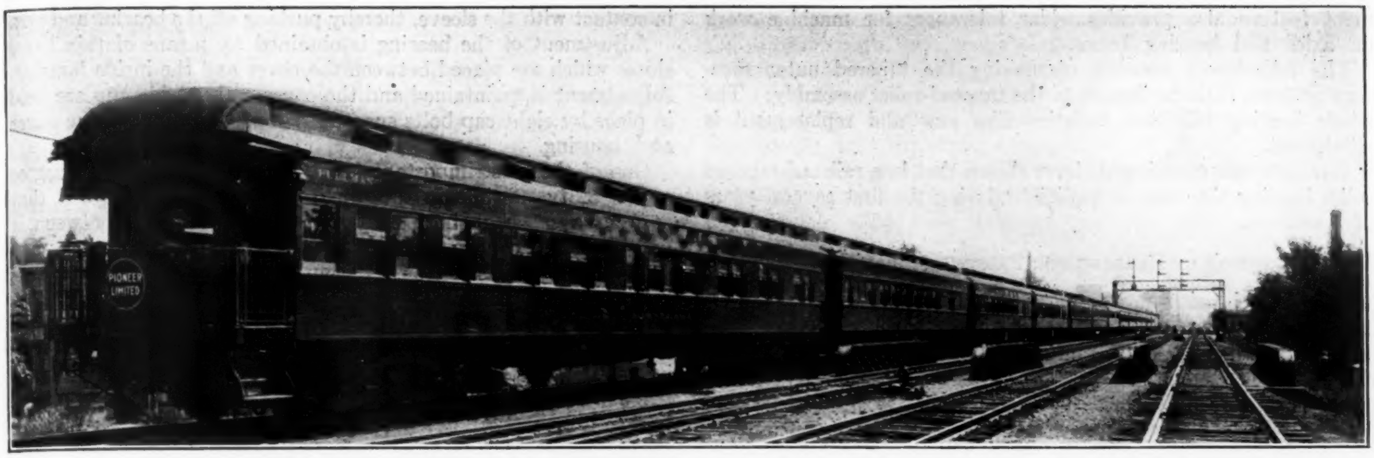


Fig. 1 The "Pioneer Limited" of The Chicago, Milwaukee & St. Paul Railway. All Cars Are on Tapered Roller Bearings the Same as the Eight "Olympian" Trains Operating Between Chicago, Seattle, and Tacoma

The Design and Application of Roller Bearings to Railway Rolling Stock

By WALTER C. SANDERS,[1] CANTON, OHIO

THE use of roller bearings on railway cars is receiving a great deal of attention at this time when refinements in engineering and perfection of equipment are dominant thoughts in the minds of progressive railroad men.

The problem of producing roller bearings that will stand up under the severe service on railway rolling stock has been a very difficult one. The design must reflect general railroad practice as far as possible and must show economy in every way.

In order to successfully apply roller bearings to the journals of railroad equipment, certain conditions should be met as follows:

- *a* The bearing must have a low frictional resistance for all service conditions
- *b* The bearing must have a long service life
- *c* The design of the bearing should be such that both vertical and thrust loads or any combination of these loads may be carried by the bearing proper
- *d* The application should be such that a quick inspection may be made
- *e* The application should be simple in construction and easy to assemble and disassemble
- *f* The bearing should be adjustable
- *g* The bearing must be durable in every way.

Many attempts have been made during recent years to solve for railways the problem of anti-friction journal bearings. Failures have ordinarily resulted from one or more of three causes: (1) The crushing strains under heavy loads and blows upon the surfaces of the metals in rotating members and raceways, resulting in fatigue and fractures; (2) the diagonal twisting and jamming of rollers; and (3) the troublesome end thrust which may at times equal 40 per cent of the vertical load.

The extensive use of self-propelled gasoline coaches within the last few years has given considerable impetus to attempts to produce a practical bearing for railway service. Because of the limited power of the gasoline engine, it was necessary to take advantage of every means possible to improve the load characteristics of the car proper, especially with respect to starting and acceleration. To make a long story short, the car designers turned to anti-friction bearings as a possible remedy. Their application produced such remarkable results not only in improved starting and acceleration but in the matter of fuel economy and general operation, that bearing engineers were encouraged to continue their efforts to produce a bearing suitable for heavy railway service.

How service requirements are met in the case of the bearing developed by the company with which the author is associated, can best be shown by a description of the bearing itself.

The Tapered-Roller-Bearing Principle

The principal object of the tapered construction is to provide capacity in the bearing for the thrust loads, which exist in all railroad applications, with no appreciable sacrifice in vertical load-carrying power. Fig. 2 shows a Timken roller bearing with an included cup angle of a little less than 24 deg. Assuming a load of 100 units *AB* applied radially or vertically to the roll, the normal pressure *CB* on the roll is 102 units. The thrust capacity of this particular roll is represented by the line *AC* and is equal to 20 units. By reason of the fact that only the top rolls in the bearing carry vertical load, while all the rolls are effective under thrust load, the bearing has a thrust capacity almost equal to its vertical capacity. In other words, with an increase of 2 per cent in the normal load on the rolls under vertical loading a thrust capacity equal to the vertical capacity is obtained. By varying the included cup angle the ratio of thrust to vertical or radial capacity can be changed over wide limits.

Another advantage of the tapered construction has proved, however, to be quite as important as the provision for thrust loading. Operation of a roller bearing, particularly at the higher speeds, requires correct alignment of the rollers with respect to the axis of the bearing. If the rollers are not accurately aligned, contact with the races over their entire length will not be obtained and dangerous concentration of stresses on small areas will result. In Fig. 2 the reaction of the roller against the rib on the inner races is represented by the line *DE*. The end of the roller makes contact with the rib on two areas *F* and *G*. This double contact holds the rolls in positive alignment entirely independent of the cage and assures an equal distribution of stress over the length of the roll. The aligning principle has been checked by operating bearings without cages at the highest speeds at which the bearings are required to operate in service. The cage acts as a roll spacer when in service and as a retainer when the bearing is stored or handled.

The tapered roller bearing is practically frictionless, the rolling resistance being less than three-tenths of one per cent.

The tapered roller bearing can be satisfactorily adjusted for the small amount of wear which may eventually occur. This adjust-

[1] General Manager, Railway Division, The Timken Roller Bearing Company. Assoc-Mem. A.S.M.E.

Presented at the Regional Meeting of the A.S.M.E., Seattle, Wash., August 29 to 31, 1927. Abridged.

ment feature also provides wider tolerances for machine work on axles and bearing boxes.

The adjustment consists of moving the tapered outer raceway or cup a little farther on to the tapered-roller assembly. The whole bearing will then function like new and replacement is eliminated.

Our tests and experiments have shown that in a railroad tapered roller bearing the wear is negligible during the first several years of operation.

Description of Bearing for Passenger-Car Equipment

Since the bearing now used on 62 Pullmans and 65 various types of passenger cars on the Chicago, Milwaukee & St. Paul Railway is a typical railway application, its description will serve to cover the essential characteristics. The bearing consists of four main parts, the double cone, or inner raceway, two sets of tapered rolls, two cages, and two cups or outer races. The cone, which is common to both sets of rolls is formed with ribs at both outer ends, and is tapered up to a ribbed apex in the middle. The two sets

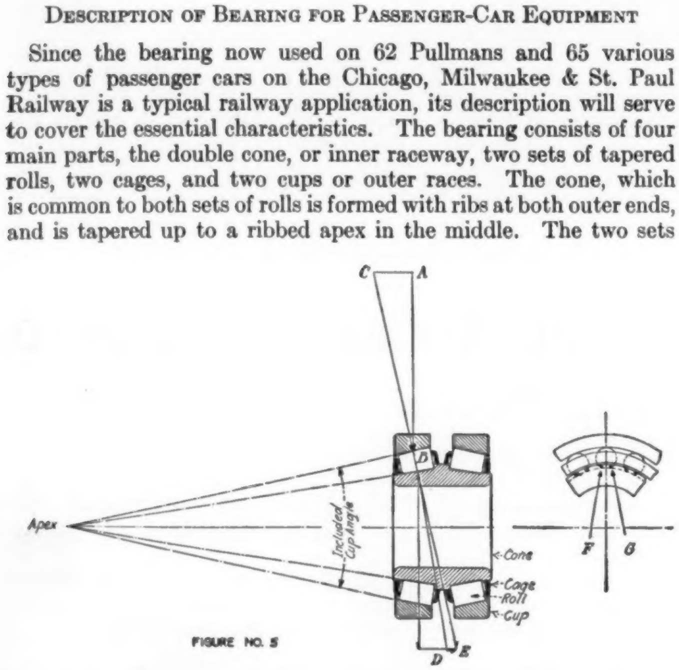


Fig. 2 Diagram Showing Theory and Design of Tapered Roller Bearing

of tapered rolls are assembled on the cone and are held to proper spacing by their respective cages. The two cups are then assembled over the rolls. The bearing is assembled in the housing and then pressed on the axle, after which the adjustment is made by shims.

The dimensions of the bearing for a 5-in. × 9-in.-journal-size axle are: bore, 5 in; outside diameter, $11^5/_8$ in.; and width of cone at its contact with the axle, $6^1/_4$ in. The rated capacity of one bearing is 28,900 lb. vertical and 23,275 lb. thrust load, at 750 r.p.m., which with 36-in. wheels corresponds to 80 miles per hour train speed. The capacity of a 5-in. × 9-in.-journal-size axle is 32,000 lb., while the two bearings used per axle have an actual vertical capacity of 57,800 lb. at 80 miles per hour and 69,400 lb. at 500 r.p.m. or 53 miles per hour.

In assembling the cone is mounted on the axle under a heavy press fit of from 20 to 30 tons. This will insure the cone's remaining tight and prevent wear on the axle by creeping. The cups are given a press fit in the housing of 3 to 5 tons insuring against rotation or creeping in the housing.

The journal box proper consists of two housings, called the inside and outside housings, and the cover. For this reason it is generally called a double box or self-aligning application. The inside housing which contains the bearing is crowned at the top and bottom; the crown having about the same radius as the plain-bearing-box wedge, which gives the application the feature of self-alignment. When the top is worn the housing may be rotated 180 deg., and a new aligning surface will thus be brought in contact with the outside housing.

The enclosure is an integral part of the inside housing and consists of a series of annular grooves. It is placed over the axle sleeve which is also called the cone-removal sleeve. The enclosure has a very small clearance with the sleeve in order to prevent leakage of the lubricant. The cone-removal sleeve also serves the purpose of removing the bearing and box in case it is necessary to remove the wheel. As the wheel is pressed off the axle it comes in contact with the sleeve, thereby pushing off the bearing and box.

Adjustment of the bearing is obtained by means of thin brass shims which are placed between the cover and the inside housing. Adjustment is maintained and the cover and outside cup are held in place by eight cap bolts spaced around the outside of the cover and housing.

One of the most important features of the design is the degree of flexibility possible in the application. It will be noted that there is a space on both ends of the inside housing between it and the outside housing. The wheels, axles, and bearings may move this lateral distance relative to the truck and car body. This high degree of flexibility is essential for six-wheel trucks and is also desirable for four-wheel trucks.

It can be seen that the whole construction is characterized by its extreme simplicity. Furthermore, freedom from internal friction has been assured by relieving the cages of all responsibility in the matter of keeping the rollers in proper alignment with respect to the cone; this function being performed by the center rib. Because of the enclosure construction which has been adopted, lubrication is made a simple matter, and sufficient space has been provided to accommodate a supply which will last over a considerable period of time. Also, since the two sets of rolls exert centrifugal pressure toward the center of the bearing, the grease is forced into the space between the two sets of rolls and constant and uniform lubrication is assured. Contamination of the lubricant from outside is entirely prevented by the construction of the enclosure.

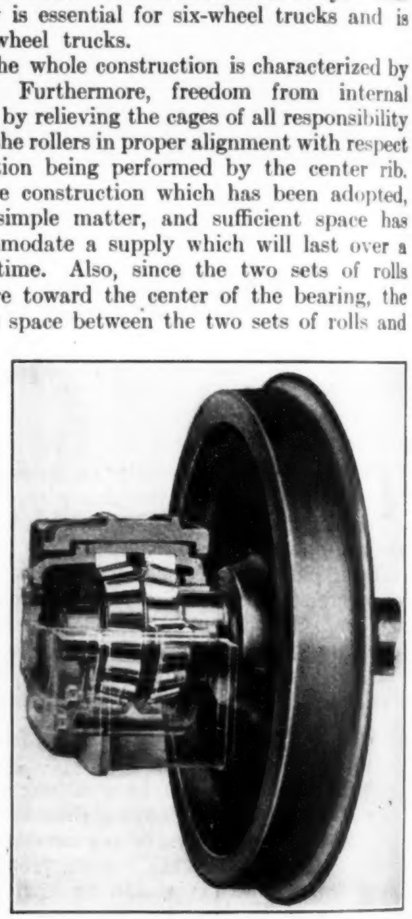


Fig. 3 X-Ray View of Tapered-Roller-Bearing Application for Passenger Equipment

Comfort to Passengers

The author of this paper was a passenger on the first trip of the "Pioneer Limited," which was the first completely equipped roller-bearing Pullman train in the history of American railroads. The easy-riding qualities were very noticeable, and the train started and stopped with a yacht-like motion and without jerks.

The change from standstill to motion on a roller-bearing train is almost imperceptible.

It has been discovered that the ends of the cars have the same riding qualities as the center, and ticket agents make good use of this fact in disposing of berths in the ends of cars. The use of the roller-bearing trains on the Chicago, Milwaukee & St. Paul Railway has been the means of an increase in passenger traffic.

It is true, of course, that the improved riding qualities are partly due to the tighter buffers and stiffer draft gears, which eliminate all slack between the cars. When starting, all cars start simultaneously with the locomotive. When brakes are applied, all cars come to a stop without slamming each other, regardless of how the braking force of one car may differ from that of another. Transverse shocks originating at the track are absorbed by a sliding motion between the inside and outside bearing boxes without producing appreciable side-motion in the car.

Eighteen cars were recently handled on the "Pioneer Limited" by a locomotive which formerly hauled 12 to 14 plain-bearing cars.

The two "Pioneer Limited" trains average from 13 to 15 cars each. The eight "Olympian" trains average 12 cars each. Six "Olympian" trains are on the rails at all times.

The "Pioneer Limited" started regular service on May 21, 1927,

and no bearing failure has occurred, nor has any car been set out of the train on account of bearing trouble.

TESTS

Until recently there has been a general tendency to underrate the retarding effect of journal friction and the power required to overcome friction in railway operation. It has been conclusively shown that the practical elimination of friction by roller bearings means a saving in power costs, and it is now becoming apparent that the weight of cars should not rest upon a sliding surface which will retard the rotation of the journal. Relatively, it is as important that the bearings should roll as it is that the wheels should roll.

The energy consumed in hauling a train depends, of course, on the total resistance. This is composed of several factors such as journal friction, rail resistance, air resistance, grade and curve resistance, and that form of resistance which is caused by vibration or oscillation, all of which may vary considerably under different conditions of track, speed, weather, and train combinations.

The component parts of train resistance can be divided into two groups, namely:

a Resistances which will vary directly with the speed, comprising journal friction, rolling friction, flange action, and track resistance

b Resistances which increase with the square of speed, namely, all forms of air resistance.

The reactions between wheel and rail may be grouped under two heads, vertical and lateral. In the former category are rolling friction, track resistance, and impact at points. Lateral resistance

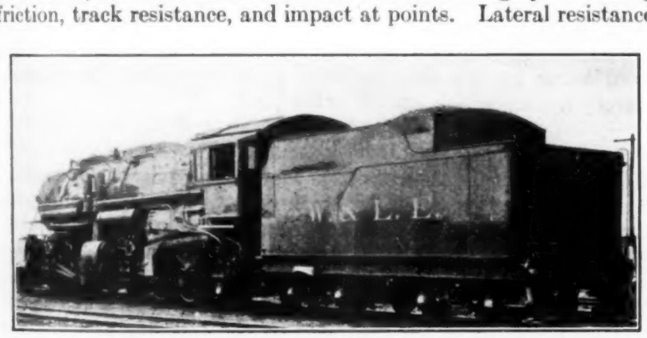


FIG. 4 MALLET LOCOMOTIVE EQUIPPED WITH ROLLER BEARINGS
(This application has been in service three years. Size of axle, 6 in. by 11 in.)

is caused chiefly by what is called flange action, and varies with the speed and cross winds.

When determining the reduction of resistance due to the use of roller bearings, it is usual to compare the total resistance of a train with plain bearings and one with roller bearings under similar conditions of train weight and speed, and the saving is usually expressed in percentage of the total energy consumed.

It is evident, however, that the roller bearing can only claim the saving effected in journal friction and less weight per truck and that the variation in resistance caused by any of the other factors has no bearing on the question. Tests have indicated that at all speeds below 36.5 miles per hour the resistance due to plain bearings is considerably in excess of that of roller bearings.

Considering the resistance caused by the journal friction on a railroad car with plain bearings, we can distinguish three different periods as follows:

1 Starting period
2 Heating period
3 Period of constant temperature.

The starting resistance is of importance, especially on roads with low grades, as it is the deciding factor in determining the size, weight, and rating of the locomotive.

Mechanical friction constitutes a large element of train resistance, and journal friction is so large a part of mechanical friction that all other elements of mechanical friction may be subordinated to it. Journal friction imposes a dead weight that must be overcome every time a wheel turns.

The first of the tests was conducted to obtain data on the comparative starting, acceleration, running, and coasting of two standard railway freight cars, one equipped with tapered roller bearings and the other with plain bearings. The two cars were of the same series and identical in every respect with the exception of bearings. The roller-bearing car had made 22,100 miles in main-line service, and the other was selected at random from among the cars usually used by the same railroad that was operating the roller-bearing car. Both cars underwent the test in the same condition as they were received from the railroad. The cars

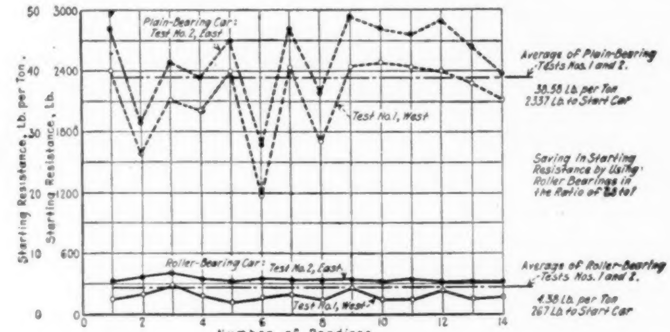


FIG. 5 STARTING-RESISTANCE TESTS OF 40-TON PLAIN-BEARING AND TAPERED-ROLLER-BEARING FREIGHT CARS LOADED TO CAPACITY

(Tapered-roller-bearing against plain-bearing freight car, 40 tons capacity, Canton, Ohio, May 22, 1925.)

Plain-Bearing Car: W.&L.E.R.R. box car No. 27,683; light weight, 43,200 lb.; load, 78,715 lb.; total, 121,915 lb.

Roller-Bearing Car: W.&L.E.R.R. box car No. 27,456; light weight, 40,400 lb.; load, 80,760 lb.; total, 121,160 lb.

Straight track with 0.15 per cent grade toward the east. Both cars tested in each direction at same place on track. Roller-bearing car had completed 22,100 miles in main-line service on W.&L.E.R.R.; plain-bearing car selected at random by same road. Both cars tested in same condition as delivered by W.&L.E.R.R. Temperature, 81 deg. fahr.

were loaded to capacity with steel billets. The following table gives weights, light and loaded, that existed throughout the test:

	Roller-Bearing Car	Plain-Bearing Car
Stenciled capacity	80,000 lb.	80,000 lb.
Weight unloaded	43,200 lb.	40,401 lb.
Load (steel billets)	78,715 lb.	80,760 lb.
Total weight (car and load)	121,915 lb.	121,160 lb.

Fig. 5 shows the results of the starting tests made between the two cars. The figure is self-explanatory but attention is invited to the fact that the ratio of the starting resistance of the two cars is 8.8 to 1 in favor of the roller-bearing-equipped car, or a saving in tractive effort at starting of 88.8 per cent.

The starting test was conducted by attaching one end of a 3000 lb.-capacity dynamometer to the car and the other end to a block and tackle. Force was slowly applied to the block and tackle until the car started, at which instant the dynamometer reading was taken. A total of fifty-six readings in both direction were taken, at 30-second intervals. An average of the readings shows the following results:

Roller-bearing car	4.38 lb. per ton or 267 lb. total to start
Plain-bearing car	38.59 lb. per ton or 2337 lb. total to start
Ratio	8.8 to 1 in favor of roller-bearing car

In the acceleration test each car in turn was hauled by a 300-hp. plain-bearing electric baggage car for a run of 20 seconds. Readings were taken as soon as the car started, and every five seconds thereafter. The average of results shows the acceleration in miles per hour per second for 15 seconds to be 0.69 for the roller-bearing car, and 0.57 for the plain-bearing car. Speed after 20 seconds was 10.54 m.p.h. for the roller-bearing car and 8.75 m.p.h. for the plain-bearing car. As to total distance traveled in 20 seconds, that of the roller-bearing car was 144.94 ft., and of the plain-bearing car, 122.23 ft. The direct power saving during the run ranged from 28 per cent for the first 5 seconds to 18 per cent in 20 seconds.

The running test was made to determine the actual saving in power consumption of the roller-bearing car. The test run was made over a stretch of track 28.30 miles long which included varied conditions of gradient and roadbed. The cars were hauled by

a 300-hp. plain-bearing electric baggage car, and readings were taken every 15 seconds. The net results indicated a power saving of 17.4 per cent in favor of the roller-bearing car.

The coasting test was conducted upon track which was in very poor condition and had numerous right and left and up and down grades. The down grade at the starting point was 0.25 per cent.

The roller-bearing car started without assistance when the brakes were released, while it was necessary to bump the plain-bearing car three times with a locomotive before it would start. The roller-bearing car coasted a distance of 7200 ft., while the plain-bearing car coasted 1300 ft.

Another test which may be cited is of considerable interest, partly because of the results obtained in the matter of power consumption, and partly because of the light thrown on the effect of journal friction on train resistance. These tests were conducted with two gas-electric trains in revenue service operating over a stretch of over 200 miles, one being equipped with roller bearings and the other with plain. The two trains were made up of cars as nearly identical in weight as possible, the actual totals being 172,360 lb. for the roller-bearing and 169,780 lb. for the plain-bearing train. The track on which the tests were run shows an average up grade in one direction of 0.056 per cent for one section, and 0.081 per cent for the other. The rail section was heavy and there was a high proportion of tangent track. Track maintenance and ballast were both good.

In the revenue-service test graphic records were made of traction-motor voltage and car speed, and the energy input to the motors. On some grades the graphic-meter records were checked by 10-second readings on indicating meters. As a further check an accurate record was kept of the time of each power application and cut-off, of each brake application, and of the duration of every stop. In fact, every effort was made to make the test as accurate as possible.

A total of twenty-six tests were made and, without going into detail, it was found that, without considering corrections for windage or different track conditions, the overall power saving of the roller-bearing train amounted to over 9 per cent on a gross ton-mile basis.

Other tests could be cited at considerable length, but since it would mean a duplication of results, these are considered sufficient to establish the case for roller bearings. It can plainly be seen that under every condition where journal friction affects operating characteristics, the use of roller bearings results in considerable improvement. In the case of starting, acceleration, and coasting, the underlying reasons for the improvement can be explained as follows:

Taking starting for example, a plain-bearing train on a level track will require a drawbar pull of several hundred pounds to overcome the resistance on each journal, the brasses of the bearings acting as so many brakeshoes until the oil film is produced. With roller-bearing journals this high resistance is eliminated and the axle is free to turn when a very small amount of power is applied because the action is rolling and does not depend to such a great extent on the presence of an oil film. The sliding friction is replaced by rolling motion, which accounts for the difference in starting characteristics.

The same principles hold true in the case of acceleration and coasting. In the former case the plain bearing will exert a braking action until the oil film is reëstablished, which takes at least sufficient time to make a noticeable difference in the accelerating period.

The difference between the two types of bearings during actual running at full speed is not nearly as great as it is at starting. When the percentage of power used in starting and accelerating a train is considered, and also the fact that coasting as much of the time as possible is a highly desirable form of railway practice, the effect of the starting and acceleration characteristics on the value of the bearings as a power saver is quite appreciable.

Tonnage Rating

On northern roads where extremes of temperature are encountered, tonnage rating is a very important factor. With the temperatures below zero the reduction in tonnage ranges from 10 to 25 per cent, depending upon the grades of the railroad.

This reduction in tonnage applies more generally to freight service, although passenger trains are also affected by the extreme weather conditions.

With roller bearings, no appreciable reduction in tonnage will be necessary and a locomotive can haul practically as many cars in winter as in summer. This fact alone will result in an enormous saving to railroads when roller bearings are adopted for freight cars.

Hot Boxes

An item of maintenance where roller bearings will effect a considerable saving is that of hot boxes. Hot boxes undoubtedly constitute one of the most troublesome conditions with which railroads have to deal. These conditions vary widely not only on different railroads but also at different seasons of the year.

They are, of course, more common on freight than on passenger cars, due probably to the fact that passenger cars receive more frequent and better journal inspections.

The frequency of hot boxes is often difficult to bring under control, and a large amount of special attention has been devoted to the situation in an effort to discover just which of the many mechanical or human elements are at fault. Usually the protection adopted as a result of such special studies aims at a tightening up of several of these elements, all of which, it may be considered, were contributory.

The frequency of hot boxes or the number per 1000 car-miles will vary considerably on different roads, due to the different conditions of operation. The cost to the road per hot box will also vary somewhat. One road has estimated that in passenger service a hot box costs approximately $30, which would indicate that a road operating several thousand passenger cars must have a large hot-box expense.

The use of roller bearings will almost completely eliminate the troublesome hot-box situation with all its attendant ills, effecting thereby a considerable saving to the road.

Lubrication

Grease of about the consistency of vaseline is being used as the lubricant for tapered roller bearings under railway cars. Bearing manufacturers have spent a large amount of money on the lubrication problems which were encountered in high-speed railway service. When oil is used it is necessary to have an unfailing supply of a correct quantity. When a large quantity of oil is fed to the bearing, excessive heat is generated by the churning action. The resulting high temperatures thin out the oil, making it difficult to retain it in the housing, even with the best type of enclosure.

Experience has shown that grease made according to proper specifications will give very satisfactory results. Grease is more easily retained in the bearing housing than oil and produces lower bearing temperatures. It will stick to all parts of the bearing and protect them no matter how long a car stands idle, while gravity will drain the oil to the bottom of the box and leave the top of the bearing unprotected.

Grease also has the beneficial effect of gumming up at the outside of the enclosure, which assists materially in retaining itself in the housing and in keeping out dirt, water, and other foreign matter.

Among the requirements of a good roller-bearing grease are the following: It shall be of the proper consistency and composed of a high-grade soap and a highly refined, well-filtered mineral oil. It must be free from corrosive matter such as grit, rosin, waxes, talc, mica, graphite, clay, or fillers of any kind.

As to the cost of the lubricant itself, although the initial cost per car may be greater in the case of grease than that of oil, greater final savings are effected because of the smaller amount of grease necessary per car-mile of actual service. Experience has already indicated that the initial supply of lubricant in roller-bearing cars lasts much longer than it does with plain bearings and costs less for renewal, partly because there is less wastage of lubricant and partly because the amount needed is usually smaller. No difficulties have been experienced with grease during low temperatures.

With roller bearings on cars, several items of lubrication expense are eliminated at the outset, and others are greatly reduced. Among those eliminated are waste and the labor charge for packing it in the bearings. In addition there is no necessity for maintain-

ing a waste-reclaiming plant, so that this expense is eliminated in cases where it exists.

A check-up on the grease used in the bearings on the Milwaukee road's "Pioneer Limited" train, running between Chicago and St. Paul-Minneapolis for the month of July, 1927, disclosed that the cost of lubricant is much less for roller bearings than for plain bearings. The previous cost to lubricate the train on plain bearings averaged 22.5 to 26 cents per 1000 car-miles. The cost of grease for the roller bearings on this train for July, 1927, averaged 15.8 cents per 1000 car-miles. Further reduction in the lubrication costs on this train is expected.

Brakes

Another question which has been raised in connection with roller-bearing operation should be considered here: that is, the effect of roller bearings on braking conditions. This may be briefly disposed of by stating they have in a general sense no appreciable effect. The braking effect depends only on the friction between the brakeshoe and the wheel and the adhesion between the wheel and the rail. The latter should always be more than the former.

There is this difference which should be considered, however, namely, that if power has been shut off and the train allowed to coast, it will have a greater speed at a given point, and roller-bearing cars will require more braking effort to stop when the limits are not predetermined. The engineman will have to apply his brake a short time sooner in order to stop at any desired point due to the difference between the journal resistance of the two types of bearings. Experience has shown, however, that stopping is much smoother due to the lack of the seizing action of the plain bearing at low speeds when the oil film breaks. The engineman should learn to shut off the power at the proper time, and take pride in the coasting qualities of his roller-bearing train.

Roller Bearings for Freight Equipment

While the application of roller bearings to passenger-train equipment is receiving the greatest attention at the present time from the railroads, the greatest benefits will be obtained through their application to freight-train equipment.

The company with which the author is associated has in successful operation a number of 50-ton and 70-ton freight cars embodying an entirely new type of inboard trucks. It is believed that this type of truck can ultimately be built by the car builders and railroads, including the roller bearings, at a cost not greatly exceeding that of the existing type of freight truck. An inboard truck, is one having the bearings mounted in a housing on the axle inside the wheels, there being no journal boxes and bearings outside the wheels. The freight cars equipped with this type of inboard truck weigh appreciably less than the plain-bearing freight cars, thus effecting a power saving because of their lighter weight as well as through the use of roller bearings.

Fig. 7 shows the method of testing the inboard truck in the laboratory: one truck is turned upside down on the other, and the wheels driven by means of a belt from an electric motor. The full axle load is applied and the trucks are operated continuously at speeds of from 45 to 65 miles per hour until something happens. The test has been frequently interrupted on account of failure of side frames, springs, and wheels, but the performance of the bearings indicate them to be the most substantial component parts of the truck.

The desirable features of the design of the inboard truck are, first, a marked saving in weight due to the reduction in length and diameter of the axle and a reduction in length and cross-section of the bolster and spring plank, and second, simplicity of design.

It is a fact that to whatever extent the non-productive weight of the car can be reduced, to that same extent the productive weight may be increased.

As the expenditure of fuel in hauling a ton is the same whether or not the latter is paying freight, it is evident that the smaller the percentage of non-paying freight or dead weight to the total moved, the smaller will be the cost of hauling the paying freight.

It is therefore a means of increasing the efficiency of operation to decrease the non-productive weight of the car. The inboard type of truck will accomplish this, as well as affording all of the other advantages inherent in roller bearings.

The inboard-type truck is still in the experimental and development stage, although the tests have progressed far enough and the results obtained have indicated that this type of design is very feasible.

The adoption of roller bearings for freight-train cars, regardless of the design of truck, faces the difficult problem of interchange. However, so great are the potential savings, that there can be no question about finding a way to solve the interchange problem and put these savings into effect.

Summary

The advantages and savings made possible by the use of tapered roller bearings can be capitalized in different ways for different kind of traffic. On freight trains it is best to increase the number of cars per train and use a correspondingly smaller number of trains. On passenger trains it is usually difficult to reduce the number of trains and the advantage here is mostly in handling more cars, in the saving in fuel, in comfort to passengers, and in the elimination of delays caused by hot boxes.

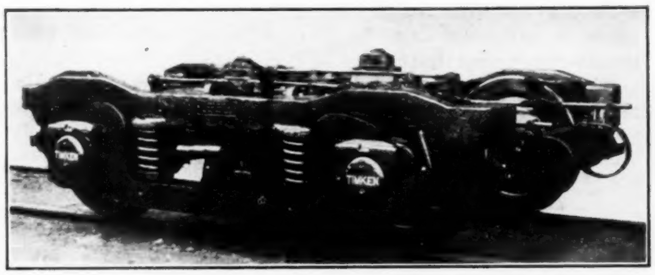


Fig. 6 Four-Wheel Roller-Bearing Truck in Use Under Rock Island Suburban Coaches

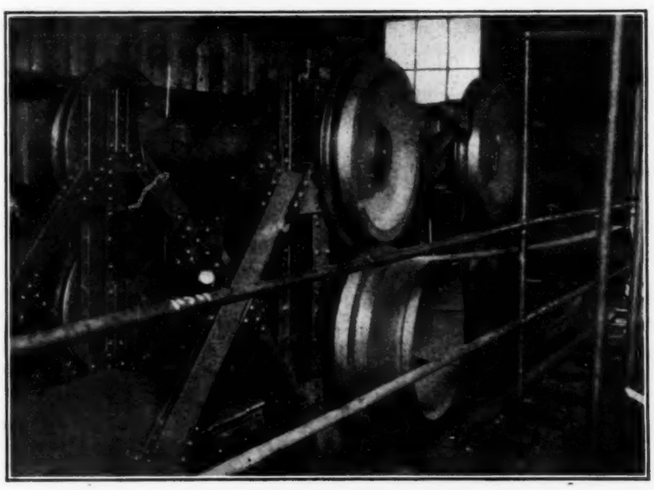


Fig. 7 Method of Testing Inboard-Type Trucks in Laboratory. Full Axle Load Is Applied and Trucks Operated Continuously

Besides the saving in fuel, the freedom from overheated bearings is an item of great importance and should alone be sufficient reason for installing roller bearings on fast express trains.

Further, the use of roller bearings is advantageous from a maintenance standpoint in the matter of the upkeep and general durability of the bearings themselves, as compared to those of plain bearings. Opinions vary considerably as to the life of the various parts that go to make up the ordinary plain bearing, but estimates made by one representative railroad from data gathered on the performance of a number of passenger cars over a considerable period, may be taken as fairly significant.

These estimates give the life of the brasses at about 30,000 miles, of axles about 360,000 miles, and of wedges about 300,000 miles. Obviously, however, the brasses are the most expensive item of the three and cause the greatest amount of expense for replacement. On the other hand, the life expectation of a tapered roller bearing in passenger service should, under normal operating conditions, be over a million miles, and this with a minimum amount of labor and money to keep it in running condition. The

magnitude of the savings thus made possible in the case of a railroad operating thousands, or even hundreds, of cars can be easily imagined.

The other savings that may be expected are practically impossible to state in figures, or even estimates, because under most conditions it would be exceedingly difficult to trace them directly to their source in bearing operation. This statement refers principally to improvements such as reduced wear and damage to rolling stock resulting from better starting and accelerating conditions.

Since freight-revenue rests entirely on a ton-mile-time basis, not much elaboration is necessary to bring out the full extent of the economic advantages of roller-bearing trains. From the other aspect of railway operation, that of maintenance expense, roller bearings should also play a large part on improving existing conditions. Because of the wide variations in conditions on different railroads it is not possible at this time to make any accurate statement of just what percentage of reduction may be expected in the different items that go to make up a railroad's operating expenses. However, since some hitherto standard items will be eliminated altogether, it is possible to give some idea of what may be expected generally, from which deductions can be made in individual cases by those who are acquainted with the details concerning that case.

The economic advantages to be gained by the universal adoption of roller bearings for use on railroad cars are of many different kinds. The more important may be summarized as follows:

1 The easy running and starting qualities make possible material saving in fuel or energy.
2 The small consumption of lubricants reduces the cost of lubricants. Cost of waste is eliminated.
3 The elimination of the costly and troublesome hot boxes makes it possible to maintain regular and undisturbed traffic, preventing inconvenience to passengers and delays to freight.
4 Reductions can be made in maintenance inspection expenses as roller bearings do not require the attention now necessary to maintain plain bearings.
5 Roller-bearing cars preclude the necessity of cutting down train loads during winter months and make possible the movement of greater tonnage with less power. Roller-bearing cars coast much more readily and longer distances than plain-bearing cars.
6 The wear and strain on railway rolling stock is materially reduced where roller bearings are used.
7 Roller bearings eliminate the necessity of replacing axles due to worn or cut journals. No wear can take place on the axle.
8 The easy-riding qualities of rolling stock are increased as a roller-bearing train starts and stops more smoothly than a plain-bearing train, and has less sway and slap at high speeds.
9 Faster acceleration and greater speed may be obtained.
10 Roller-bearing cars will start on grades where power is required to start plain-bearing cars.

Roller bearings will bring to the railroads economies so wide in scope and so far reaching in effect as to make it practically impossible to estimate even approximately the savings that will result from their general adoption.

What Is Engineering?

The Mining and Metallurgical Society of America has conducted an inquiry among its members with the hope of formulating a definition of the word "Engineering" that will stand against criticism. The following excerpts are from a progress report published in the current issue of the "Bulletin" of the society:

Wide interest in the definition of "Engineering" has been shown by the number, length, and character of the replies received to the letter sent to all members by authority of the executive committee. There is a growing appreciation of the necessity for an "engineering" as well as a legal definition of "Engineering," and the society is hopeful of accomplishing this task. However, it is a very difficult one and subject to many shades of consideration and criticism.

The definition suggested by the original committee, composed of F. L. Sizer, chairman; Corey C. Brayton, S. S. Fowler, and Robert A. Kinzie, was:

> *Engineering is the practical application of scientific methods to the utilization of the resources of nature for the use of man.*

This definition, and an amended form, as follows, were sent out for comment:

> *Engineering is the application of scientific methods to the utilization of the resources of nature.*

Percy E. Barbour offers the following:

"I have been a member of the New York State Board of Licensing for Professional Engineers and Land Surveyors for seven years, and have seen the board continuously handicapped by the lack of a proper definition of 'Engineering.' The board has never attempted one, and up to the present the ideas of its several members have not been in accord. Until now I had never had the temerity to try to formulate such a definition. But the benefit of the study of the pros and cons of the subject sent in by our members plus the increasing need for such a definition that I have felt during the last seven years has stimulated me to make an effort which I submit not with the idea so much of being original as with the sole desire to be helpful in crystallizing the thought that has been put upon the subject by so many:

> *'Engineering is the judicious application of the technical sciences to the human solution of inanimate mechanical problems.'*

"The word 'judicious' implies thought and experience, and, based on both, judgment. Without judgment one cannot be an engineer. A new technical graduate or a neophyte or dilettante may know more or less theories, but his use and application of them will not be engineering unless he applies them properly or judiciously.

"The word 'application,' which may be either mental or physical, implies use, and differentiates the engineer from the pure scientist or the theorist, who, having produced, a theory, however valuable, leaves it to the engineers to be used.

"'Technical' is defined by lexicographers of recognized authority as 'pertaining to the mechanical arts,' hence the use of the words 'technical sciences' differentiates the engineer's art from that of the physiologist or biologist, both of which are highly scientific.

"'Engineering' as generally employed, which we are trying to reduce to words, is not the application of the sciences or knowledge to the resources or forces of nature, but the application of such erudition to accomplishing something by humans, even though it may not be humane. Each such accomplishment is the solution of the individual's problem, hence the use of the words 'human solution.'

"Pseudo-engineering of human problems, 'engineering of men,' etc. is not engineering at all; it is psychology. When the engineer, as he must at times, leaves inanimate problems, he is not doing engineering, however vital this may be to the economic success of his engineering problems. Hence the word 'inanimate' in the definition.

"No educational qualification can properly be included except so far as it is covered by the word 'judicious.' Education is a relative term, and may be acquired (more or less) within the classic walls of a proud educational institution or in the school of hard knocks.

"'Judicious' also seems to cover all that the word 'practical' would, but without the many objections to the latter. Moreover, I doubt that the word 'practical' really expresses what its advocates have in mind."—*Engineering and Mining Journal*, Nov. 5, 1927, p. 735.

Reversing-Blooming-Mill Practice

A Résumé of Current Practice, Dealing with Cogging, Drafting Practice, Driving the Main Rolls, Reversing Steam Engines and Motor Drives, Mill-Train Design, Etc.

By GEO. A. RUSSELL,[1] SHEFFIELD, ENGLAND

IN THE early days of the commercial development of bessemer and open-hearth steel manufacture the ingots underwent a mechanical treatment similar in many respects to that accorded the puddled balls of wrought iron, the practice for which had become standardized in the late sixties of the last century. They were worked initially under the direct-acting steam shingling hammers (which had then replaced the old helves in the more progressive establishments) and reduced to a cross-section compatible with the capacity of the light finishing mills in which the final shaping was done. It was not unnatural, therefore, as the qualities of the new material became better known and the demand for it grew, that works should continue to adopt the same type of plant when making extensions to provide increased capacity. It soon became evident, however, that the slow rate of reduction possible with the cogging hammer and its high labor cost made this appliance an inefficient link between the steel works and the finishing mills under more onerous conditions. Its low technical efficiency was also a contributory factor, but only a secondary one, as economy of operation was not then the matter of prime importance that it is nowadays. To dispense with the intermittent hammering operation and to carry out the complete reduction of the ingot by the more efficient rolling process, was the logical way to better practice.

With the introduction of three-high and reversing mills and live roller tables it became feasible to deal with pieces of considerably greater weight than had hitherto been practicable. American engineers were not slow in utilizing these innovations to improve their cogging practice. The first blooming mill, which was of the three-high type, was installed at the Troy works by the late A. L. Holley early in 1871. Very shortly afterward a second and much improved mill was put down at Cambria, under the direction of the late John Fritz, and the three-high blooming mill was almost exclusively employed in the United States until the close of the last century. About this time the unit weight of ingots began to be increased, partly on account of the development in open-hearth-steel production which was then taking place, and partly owing to a desire to increase the efficiency of the pit practice in existing plants. Also the growing stringency of specifications pointed to the need of a higher coefficient of working in finished products. The employment of these heavier ingots soon disclosed several grave defects inherent in the three-high mill. The lifting tables, especially, became a source of anxiety and expense as they were exceedingly hard to maintain, and in new installations very ponderous and cumbersome. Again, the limited flexibility imposed upon the permissible rolling program by the fixed gating of a set of three-high rolls made it extremely difficult, if not impossible, for the blooming mill to supply semi-finished material for more than one purpose at a time. For these and other reasons American steel works were more or less driven to adopt the reversing mill, and, generally speaking, they have adhered to it since. It is not now the usual practice, however, to break down the ingot as much as heretofore at the blooming rolls, because of the widespread employment of continuous mills of the Morgan type for the production of billets and small slabs. Only in some of the single-purpose mills of immense productive capacity does the three-high mill retain a place in large modern plants. In such installations it has naturally only a very definite rolling program to fulfil, a condition which well suits its characteristics. Even in these rather exceptional cases it is generally supplemented or preceded by a couple or more stands of two-high non-reversing rolls in which the preliminary reduction of the ingot is carried out, as at the Gary and Edgar Thompson rail mills. In Europe, generally speaking, the three-high mill has never attained to any large share of favor, and is but rarely met with today.

Reversing blooming mills thus play an important part in the production of the world's output of structural steel, and are in no small measure responsible for the relative cheapness of this vitally important material. Progress of late years has been characterized by a steady evolutionary growth rather than by the production of startling innovations. Nevertheless, for productive capacity, economy in operation, and reliability, a plant of the present day is as much superior to that of fifteen years ago as was the latter to the early installations.

Cogging

As the first mechanical treatment which ordinary structural steels receive is in cogging down from the ingot form to some smaller section, it is a matter of importance to study the effects of this initial treatment on such steels in their "as cast" state and its influence under varying conditions on the general quality of rolled products.

During the first few passes the principal effort of rolling will be to close up the existing voids and knit together the inner regions of the ingot. Welding follows whenever the condition of the crystal facets, thus pressed together, allows of it. The bulk of the total-deformation-energy requirements for these passes is expended in this manner, comparatively little going toward displacing the particles in the direction of rolling. When once the ingot has been compressed in this way, practically the whole of the deformation energy subsequently expended will be utilized in displacing the particles in the direction of rolling.

Drafting Practice

Increasing the unit weight of ingots reduces the cost of steel in ingot form by reduction in handling costs and ingot-mold consumption, and this may be said to hold good for all ingot weights that are likely to be employed in "tonnage" plants. It is not so certain that heavy ingots produce a better or even as good a quality of finished products, but it is probable that some of the comparisons made in the past, when the fundamental importance of casting conditions and mold proportions were less realized than they are nowadays, have tended to obscure the issue. At the present time little importance is attached to this matter provided that the metallurgical practice is sound in any particular instance.

In view of the tendency toward the casting of heavier ingots, it is necessary to examine rather more closely the effect of this tendency on blooming-mill practice. The use of heavier ingots at the outset entails a heavier and more expensive plant, greater maximum capacity of the driving unit—which results in increased capital cost—and consequently higher fixed charges whose incidence can only be lessened by a greater output. Therefore, unless there exists a large market for the products of the mill acting as a powerful inducement to raising its output to the maximum, the more costly plant required for the heavier ingots tends to increase the overall rolling costs. On the operating side, however, any increase in the weight of ingot decreases the working costs by reducing the power used for auxiliary services as well as for the main rolls. The proportion of usefully expended work to idle work increases as a result of the reduction in the number of reversals per ton, and of idle running at the ends of passes. It is thus evident that with any given installation the greatest efficiency will be attained when the heaviest ingots that the plant can deal with are employed, the interests of the steel plant and rolling mills being happily identical in this respect.

The proportions of the ingot, important from the point of view of quality, are no less so from that of rolling efficiency. As the energy expended in cogging is a function of the elongation worked to, it is highly advantageous to cast ingots as long as possible in

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relation to their mean cross-section. Another important advantage which accrues from the use of heavier ingots is the reduction in the weight of crop ends produced per ton and the consequent increased yield.

With a modern heavy mill it is not, generally speaking, an economic proposition to roll down to less than 6 in. square. Anyhow no great proportion of its output should go into billets of smaller section. A few years ago 4 in. square was considered the limiting size for a large mill, but the improvements that have recently been made in design, although they have greatly increased the productive capacity of a plant, have likewise increased its capital cost, and so render its employment justifiable under conditions favorable to good efficiency. Now it is only possible to deform steel economically with small rolls, that is to say, the ratio of the effective diameter of the rolls to the height of the piece should be as small as considerations of roll strength and engagement permit. The large rolls of a blooming mill obviously cannot fulfil these requirements over such a wide range, so gradually the employment of a separate billet mill with smaller rolls has come into vogue. In the United States these billet mills are very generally of the Morgan continuous type, taking from 6-in. to 8-in. blooms from the blooming mill, and rolling them right off to any desired billet or slab section down to 2.25 sq. in. Without doubt the continuous mill is the most efficient means for the production of billets, when the available market is such that the mill can be operated at maximum capacity for a good percentage of the time. Although the mechanical efficiency of the continuous mill is unavoidably poor, this is more than offset by the low energy consumption required for actual deformation resulting from the small-diameter rolls used, the heavy drafts taken, the high rolling speeds, and the absence of handling between passes, reducing the temperature drop, even with small sections, to a minimum. In Europe continuous billet mills have not, for one reason or another, made so much headway, but of late years their undoubted advantages under certain economic conditions have begun to be appreciated. The usual European billet mill is a two-high reversing unit with relatively large rolls, and is frequently driven by the engine or motor driving perhaps a heavy rail or section mill. Such mills are uneconomical in operation, and they should only be employed when a small tonnage of billets is all that is required.

In the proportions of the main rolls and in the arrangement of their gating, considerable divergencies between American and European practice are noticeable. In general the American practice is to keep down the length of the roll barrels to a minimum by having the least number of gates possible, and effecting the bulk of the reduction in "open" passes. The typical European method is to endeavor to roll in grooved passes, which naturally necessitates a good many more gates in the rolls and so increases their length. Strength necessitates a considerably greater minimum diameter in the latter case to resist the increased bending movements and twisting strains. This entails greater power consumption per unit of deformation. It will probably be admitted that rolling in grooved passes produces more shapely blooms, which of course would be easier to handle with the more primitive types of manipulator exclusively employed in Europe until recently. This accounts in some degree, no doubt, for the still common employment of large-diameter cogging rolls there.

Driving the Main Rolls

The nature of the work demanded from the driving unit of a modern heavy blooming mill is best appreciated by considering the torque diagram and speed curve for a normal cycle of operations.

With given handling facilities the productive capacity of a blooming mill is directly proportional to the average time of pass, this being governed by the mean speed attainable, as it is essential both to grip the piece and discharge it from the rolls at a low velocity. The mean speed is chiefly influenced by the maximum speed that can be reached, and by the duration of this period of maximum speed. Obviously the rates of acceleration and deceleration control the latter factor, and they thus influence the productive capacity of the drive to an important extent. The two forms of driving units which have so far been employed for reversing-mill work, namely, the reciprocating steam engine and the reversing motor, are both capable of extremely rapid rates of deceleration, so that in actual practice it is the rate of acceleration which is the vital matter.

It is now generally admitted that there is little to choose between the operating suitability of steam engines and motors for blooming-mill drives. If anything a well-designed steam engine possesses a slight advantage over a motor in being able to accelerate against load to full speed and to decelerate more rapidly. Recently introduced modifications in the design of reversing motors have placed them in a much better condition to compete in this respect. On the other hand, however, the claim made on behalf of the electric drive that the energy consumption per unit of deformation is lower than with the steam drive, has not been realized in practice.

Only on the question of capital cost is there a really marked difference between the merits of the two systems of driving, and this factor favors the steam drive—so much so that in many cases its effect on the power costs per ton of rolled product counterbalances any comparative saving in the operating items making up this cost with which particular local conditions may favor the electric drive. In making this statement the author has in mind the relative cost of steam and electric drives, when an amount of the works power-station capital cost, proportional to the mean load that the mill will put upon the station to the capacity of the station, is taken as part of the cost of the electric drive. In these circumstances the ratio will be between 1:1.5 and 1:2.0.

As the blooming mill is the pivotal unit of the whole system of mills in a works, its reliability is a matter of paramount importance. A breakdown of any part of the mill train can usually be repaired in a comparatively short time, as extensive spares are always stocked of those pieces which are at all liable to give out and the nature of the work is generally simple and straightforward. This is often far from being the case with the driving unit, whether engine or motor, and so in any large works where there is neither a second blooming mill nor a mill which could function as such as a temporary measure, it is a matter for serious consideration as to whether it is advisable to install a duplicate drive to insure virtual immunity from lengthy stoppages. This course is sometimes taken in continental Europe, although naturally it is a very costly one.

Reversing Steam Engines

In surveying the reversing engines already in service, one is somewhat struck by the apparent lack of attention paid to thermodynamic and mechanical principles of design in many instances. This failure to develop reversing-engine design upon a rational basis has, in no small way, been responsible for the fact that at the present time this very excellent form of driving unit is threatened with extinction by its vigorous competitor, the reversing motor, even under economic conditions which render it the best form of motive power for reversing-mill operation.

With the gradual but sure improvement in the organization and operating personnel of the auxiliary services of a steel works, such black spots as the old-time boiler house, with its crude steam-generating units and auxiliaries, need no longer be accepted as inevitable. Boiler pressures which a few years ago would hardly be entertained are now looked upon as low, and the newest works, more particularly in the United States, are adopting pressures almost on a par with conservative central-station practice for their general plant steam supply. This factor is of vital importance to the reversing engine, as one of the principal handicaps it has previously labored under has been the extremely low steam pressures it had to work on; large cylinder capacity was imperative to make up for the low m.e.p. obtainable, and this increased the initial condensation and mechanical losses. Pressures up to 210 lb. per sq. in. are now in use, and a large reversing engine has recently been built which takes steam at 250 lb. per sq. in.

The relatively late cut-offs necessary with reversing engines, even when of the three-crank type, preclude the simple-expansion arrangement from being employed when high steam pressures are available, unless the exhaust is fed to a low-pressure or mixed-pressure turbine. This arrangement, though attractive from some points of view, is not in the author's opinion a good one for a new plant as the intermittence of the engine exhaust renders its storage a difficult matter, and an important amount of steam is nearly

always lost. This, coupled with the storage losses, goes far to neutralize the somewhat better efficiency of the turbine at high vacuum.

By the adoption of the compound principle with a judicious proportioning of the high-pressure and low-pressure cylinders, or by making use of one of the modifications of the uniflow system, full advantage can be taken of high steam pressures.

The tandem-compound arrangement is the only one that can be entertained for blooming-mill service, as any cross-compound engine suffers from the disability of low and irregular starting torque, unless provision is made to admit live steam to the low-pressure cylinders automatically for the first few strokes, which procedure materially increases the steam consumption, especially when the mill is rolling only to a small number of elongations. Tandem-compound engines are still associated with sluggish operating characteristics. With the best engines this is far from being the case, and they are as prompt in responding to the rapidly fluctuating torque and speed requirements imposed upon them as any simple engine. The most important factor in securing promptness in a compound engine is the control of the receiver steam.

While it is thermodynamically of little benefit to supply a reciprocating engine with superheated steam, in practice it is highly advantageous to carry sufficient superheat to maintain the steam dry to the end of the expansion of the low-pressure cylinder, initial condensation and valve leakage being much reduced thereby. The required degree of superheat is not high enough to increase appreciably the maintenance and working costs of the engine and boiler plant.

In the author's opinion a compound reversing engine should not in general be run non-condensing, and still less should it be arranged to exhaust into an accumulator or a feedwater heater, as only under medium and heavy loads can the low-pressure cylinders be really effective in such cases. The vacuums obtainable in every-day practice with modern condensing plants of simple design are high enough to realize the full commercial advantages that condensing offers.

In the mechanical features of modern engines, two outstanding changes from previous practice are noticeable: one is the gradual abandonment of the geared drive and the other the reduction in inertia forces and improvement in the balancing by better proportioning of all moving parts, especially in the reduction to a minimum of the reciprocating masses. The geared drive is now only adopted for the heaviest slabbing mills, and even for these mills it is not universal. Continental builders have gone considerably further than British or American constructors in cutting down the reciprocating masses by employing more suitable material for the different components, and by improving their design. Among the improvements introduced have been hollow piston rods, cast-steel piston heads, H-section connecting rods, and the suppression of tail-rod guides. The care given to these details is reflected in the reduction in cross-sectional area of metal necessary in the beds to withstand the inertia forces, and in the consequent saving in the total weight of the engine. A good Continental engine will not total 60 per cent of the weight of an average American engine of equivalent piston displacement and designed for the same working pressure. Although rolling speeds are generally higher in Continental practice than in American, these light engines are in no respect inferior in point of reliability to the heavy American machines.

Three-crank engines have firmly established themselves in England and in many parts of Europe, but in the United States their evident merits have so far been unable to win them a footing; as far as the author is aware, there are not over six three-crank engines in the whole country. This is, in all probability, because the fear of heavier maintenance costs, due to the third set of working parts, and has in the past gone a long way toward neutralizing the hope of obtaining better all-round working results by their employment. This fear among American steel-works engineers in regard to the three-crank engine has apparently been operative in England with respect to the five-crank engine.

Reversing Motor Drives

No aspect of heavy reversing-mill practice has received more attention of late years in technical publications than the application of electric driving. It is now generally admitted, even by electrical manufacturers, that many of the early motors were sluggish in acceleration, and this was more particularly the case in regard to the rates of acceleration attained above the normal or full-field speed of the machine. Such sluggishness compared most unfavorably with the behavior of a reversing steam engine, and undoubtedly was the cause of the lower tonnage capacity of the early electrically driven blooming mills compared with the contemporary steam-driven units. This disability naturally manifested itself most acutely in plants where a high proportion of the output of the mill was rolled into billets of relatively small section, as in this class of work the output is very greatly influenced by the time required for the later passes, and consequently by the mean speed reached during these passes.

The Design of the Mill Train

It will be convenient to consider the chief components of the mill train in the following sequence: Roll housings and their fittings, the adjustment and balancing of the top roll, spindles and their support, pinion housings, leading spindles or disengaging couplings, and, finally, the bedplates and foundations on which the train rests.

The primary function of the roll housings is to resist the separating force exerted by the piece, this being transmitted to them through the roll necks and housing fittings, and putting them primarily in tension. Their secondary duties are to keep the rolls in their correct positions and to form points of support for the screw-down and top-roll balance mechanisms. Roll housings for blooming mills are as a rule cast in one piece, as even the largest now required are still within the capacity of our heaviest steel foundries, and the railways can still handle them. Here and there mills have been constructed with built-up housings. Generally the obvious advantages of a solid casting would not be put lightly aside. A form of housing known as the A-frame type has been developed by the United Engineering and Foundry Company. Its distinguishing feature is the large circular opening into which the lower part of the window expands. This opening is of sufficient size to permit of the breast-roll shafts passing through, hence the breast rollers can be mounted in bearings in the table girders and not in the housings. Owing to the even distribution of metal in these housings, it is claimed that they are free from casting strains.

For the lighter class of mill, cast-iron housings of rectangular section can be made strong enough to give satisfactory service, but for heavy mills cast steel is virtually necessary.

The distribution of metal around the screw-box hole is important, this being one of the most highly stressed regions in the housing. A stepped screw box is much to be preferred as the load from the screw is transmitted to the housing over a greater area, and thereby decreases the tendency for local high strains to be set up.

One of the most important accessories of a blooming mill is the screw-down gear or mechanism provided for the adjustment of the top roll. Not only is it vital to the operation of the mill, but its speed and precision of working exert an influence on the productive capacity of the mill, which is accentuated when high lifts and frequent adjustments are necessary, as in the case of American practice using practically plain rolls.

A screw-down gear essentially consists of some mechanism to rotate the housing screws or nuts (generally the former) equal amounts at a time; it may be either hydraulically or electrically operated, but there is now a distinct preference for the electric drive, which is virtually the only one seriously considered for the roll lifts required in modern practice.

The nature of the duties imposed on the screw-down gear, entailing numerous and accurate movements, puts a severe strain on the electrical equipment, and the screw-down drive has in consequence come to be regarded as a crucial test for motors and control gear designed for steelworks service.

The attainment of rapid acceleration when screwing down demands a high starting torque, and this is met in modern mills by employing two motors of about 80 to 100 hp. each, connected in series, or in series when screwing down and in parallel when screwing up. With a direct-current supply compound-wound motors are preferable as they cannot run away in screwing up, when the top-roll balance gear assists the motors. Precision in control is obtained by combining dynamic braking with a powerful series

solenoid brake on each motor. In practically every instance the motors are magnetically controlled, sufficiently rugged contactor gear being now available to stand up to the service.

In arranging the screw-down mechanism, the working conditions should be carefully borne in mind. It is essential to build the mechanism on a really solid foundation if a host of minor troubles are to be avoided, and herein lies the importance of adequate bracing of the roll housings. Again, the motors should be removed as far away as practicable from the steam and heat radiated from the piece by placing them on suitable brackets well to one side, and not between or on the housings. In the best American plate mills, where the screw-down conditions are even more severe than in blooming-mill practice, the motors are generally mounted on top of the pinion housings. In arranging the screw-down gear, roll- and spindle-changing procedure must be taken into consideration and allowed for. Every precaution taken to exclude dust and fume from the mechanism, and to insure constant and adequate lubrication will be well repaid by a low maintenance bill.

Intimately connected with the screw-down gear is the indicating gear, by which the movements of the former are made visible. The essential characteristics of a good indicating gear are legibility, accuracy, and ease of adjustment to suit roll wear. The various mechanisms may be classified according to the type of indicator employed, and thus we have dial-type, drum-type, and scale-type mechanisms.

The spindles of a mill transmit the driving torque from the pinions to the rolls, and while the upper one must be capable of doing this over the complete range of lift given to the top roll, the lower spindle has only to accommodate itself to the slight changes in elevation of the bottom roll consequent upon wear of its chock brasses and upon the decrease in diameter of the necks from the same cause.

Spindles are usually steel castings of about 30 to 35 tons per sq. in. tensile strength, and these can safely be stressed up to 3.5 tons per sq. in., figuring this stress on half the maximum torque the mill is designed to take. In some instances forged-steel spindles have been adopted with the object of eliminating all possibility of breakage.

Perhaps the most radical changes in design that have been made in the construction of the mill train are those which the pinions and their housings have undergone. While fifteen years ago the open-type housing with pinions having cast teeth of coarse pitch was still being built and considered by many as good enough for any heavy mill, all this has in the meantime been changed, so much so that nowadays on large mills, even of the cheapest design, we find some effort made to enclose the pinions and to obtain greater structural rigidity in their support. In good practice the pinion housings are regarded as an "engine job," and are designed and built along the lines of the best engineering practice for heavy power-transmission machinery. This is quite as it should be when we consider the magnitude of the power transmitted through the pinions of a modern blooming mill, as well as the magnitude of the losses a few per cent difference in the efficiency of transmission make in the total power consumption of the mill.

The remainder of the paper, while very interesting, does not lend itself easily to abstracting. It deals at great length with the handling of steel; manipulating the piece at the rolls; cutting up and evacuating the product; the disposal of crop ends; scale disposal; and with the layout of the blooming mill in regard to the contiguous section of the works. The complete paper is illustrated by numerous drawings.

Integraph Solution of Differential Equations

THIS article describes a continuously recording integraph such that an equation involving two successive integrations, corresponding to practically any second-order total differential equation, with all terminal conditions included, can be solved. The need for a workable means of solving the differential equations involving empirical and discontinuous coefficients which occur repeatedly in electrical engineering and physics is recalled. In the machine described such solutions are effected by means of suitable interlinked integrating devices, the result being plotted continuously as a function of the independent variable. Tests and simple solutions show the overall error to be approximately 1 or 2 per cent.

The paper describes such a machine which, while not quite capable of handling the most general form of second-order differential equations, will solve readily a form which can be made to include essentially all second-order differential equations with one independent variable which are met in practice. Sample solutions are described and the method by which any particular equation can be solved by the machine is indicated. A discussion of practical operation, including the errors likely to arise, their magnitude, and methods of eliminating them, is included.

The integraph employs two integrating devices which perform successive integrations on the variables introduced, these operations being an essential part of the solution of a second-order differential equation. The first stage of integration uses a modified Thompson direct-current integrating watthour meter which gives the integral of the product of two independent functions, one of which may itself be the sum of two independent functions. The result of this first integration is again integrated by a Kelvin disk and wheel integrator. By a suitable mechanism each of these results is plotted automatically, and through coupling devices the original functions may have as variables either the independent variable, the result of the first integration, or the result of the second integration. It is possible and practicable thus to solve a total second-order differential equation of a form so closely approaching the most general form that exceptions are very rare.

By various devices the errors inherent in such a mechanism have been removed or reduced to safe values. No power is drawn from the integrating devices themselves, all the work being done by servomotors controlled by relays actuated through contacts on the integrators. Also friction torque in the integrators has been rendered ineffective by making the net motion between the integrating element and its main bearing zero. Errors due to lag in the mechanism have been removed at their cause or canceled by compensation. Mechanically the machine is sufficiently refined to give engineering accuracy in solutions performed with it.

Two principal sources of uncertainty of results exist. The first includes the error in plotting the functions used, and in reading the curves drawn by the machine. The second consists of the errors, random or systematic, which occur in the machine itself.

While the machine as constructed can solve directly no equation of higher order than the second, it is frequently possible by the method of successive approximations to solve either equations of the third order or two simultaneous equations of the second order. In the case of third-order equations, this can be done if either the third derivative or the constant term is relatively small so that an approximate solution can be obtained which neglects this term. Having obtained the approximation, the value of the neglected term can be obtained approximately as a function of one of the variables and added in the equation as an arbitrary term for the second approximation. Where this process results in rapid convergence, as it frequently does, the higher-order equation can be solved readily.

Simultaneous equations can be treated in the same way when each of the equations is of such form that one variable has a relatively large effect, the other variable entering as a sort of correcting factor. The equations of coupled electrical circuits or mechanical systems where the coupling is not large furnish excellent illustrations of this type of simultaneous equations solvable by successive approximations. While this may seem laborious and approximate, it is to be remembered that one solution can be run in eight minutes or less, and that making several trials is a relatively short process.

The foregoing presents some of the possibilities of the integraph in the solution of problems for which it was definitely constructed and an outline of methods by which it often can be used to handle indirectly problems which are nominally beyond its scope. Further applications and extensions of its possibilities frequently appear when other forms of equations are presented for solution. V. Bush and H. L. Hagen in the *Journal of The Franklin Institute*, November, 1927.

The Effect of Running In on Journal-Bearing Performance

By S. A. McKEE,[1] WASHINGTON, D. C.

A feature recognized by the operators of machines containing journal bearings is that a certain amount of "limbering up" or "running in" is necessary before this type of bearing behaves in a normal manner. This paper describes an investigation at the Bureau of Standards, the object of which was to evaluate this effect of running in upon the performance of babbitted, full-journal bearings.

A specially designed journal-bearing friction machine provided a method of measuring the frictional loss in a journal bearing when operating under different conditions of load on the bearing, speed of the journal, and viscosity of the lubricant. By correlating these factors in a suitable manner a measure of the effect of progressive amounts of running in on bearing performance was obtained.

The results indicate that running in causes a marked reduction in the frictional loss of a bearing under very severe operating conditions.

In the conclusion, the effect of running in upon the factor of safety of a bearing is pointed out, and the possibility of increasing the efficiency of high-speed journal bearings is indicated by a hypothetical example of a steam-turbine bearing.

ONE feature that is recognized by the users and makers of journal bearings is that, up to a certain point at least, a bearing generally improves with use. When a new machine is first started up the operator usually runs it at reduced speed and if possible under reduced load, and carefully watches to see that there is no excessive heating in the bearings; then the load and speed are gradually increased until the machine is operating at its rated capacity. Even after this condition has been reached it usually requires a rather long period of actual service before the machine becomes really "limbered up" and behaves in a normal manner.

One reason for this limbering-up or "running-in" process is that even with the best of technique in machining and finishing the working parts, the surfaces of the journals and the bearings are relatively rough and irregular as compared to the minimum thickness of the film of lubricant between them. Thus even under rather light operating conditions the high spots on the journals tend to strike those on the bearings, causing local breakdown of the oil film and corresponding increase in friction and heating. When these high spots come together, however, unless the surfaces are too rough or the load too great, a smoothing action may take place either by the tearing off of particles on the high spots, or, if one of the surfaces is made of a relatively ductile metal, by a sort of cold working. Under the proper conditions this smoothing action continues until eventually the surfaces of the journals and bearings become relatively smooth and polished.

In the past, when the usual procedure was to hand-scrape the bearings, the magnitude of this smoothing effect might be almost anything. At present, however, especially in the manufacture of the higher grades of steam, electrical, and automotive equipment, the general trend of practice is to use fixtures for obtaining the proper alignment of the bearings, to accurately grind the journals, and to use reamers or broaches designed especially to cut bearings true and smooth. In this type of procedure where an attempt is made toward producing a standardized bearing surface, it would seem that a study of the magnitude of the effects of running in on the performance of journal bearings would be of considerable interest and probably of some definite significance.

Method for Comparing Bearing Performance

The method chosen for showing the effect of running in was to measure the frictional resistance of a typical set of bearings under a wide range of operating conditions and to repeat the measurements with different degrees of running in.

A convenient graphical method for evaluating the results obtained is to compare, for different degrees of running in, the respective coefficient-of-friction curves of a bearing, plotting the coefficient of friction f against the generalized operating variable $\mu n/p$ which denotes the product of the viscosity of the lubricant by the number of revolutions per unit time divided by the bearing pressure (load per unit projected area). The justification and

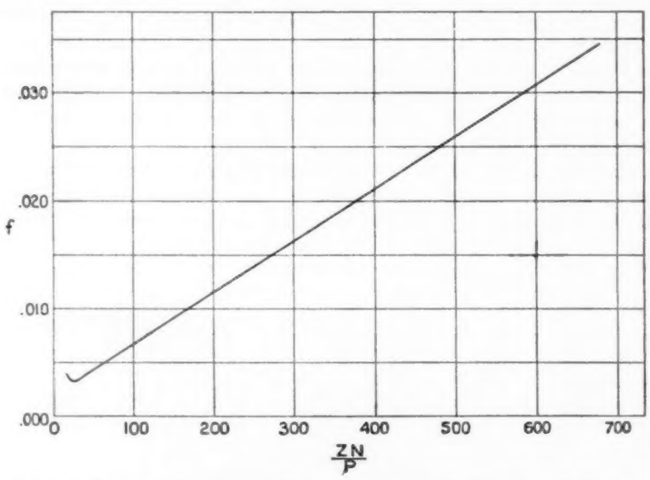

Fig. 1 Typical Curve for Bearing with $C/D = 1/100$, $L/D = 1$

advantages of the generalized variable in place of the separate operating factors have already been discussed in a paper[2] presented before this Society in 1915 and in other publications. The particular choice of units and notation[3] employed in the present work was found convenient by the author in two previous investigations,[4] and consists in expressing the viscosity in centipoises, the speed in revolutions per minute, and the bearing pressure in pounds per square inch, and in denoting the respective quantities by Z, N, and P when so expressed. The graphical method of this paper may therefore be very simply described as a comparison of the f-(ZN/P) curves for the same bearing with different degrees of running in.

A typical f-(ZN/P) curve is shown in Fig. 1. It will be noted that the right-hand part of the curve is approximately a straight line. This is the region of *stable lubrication*[3] where a complete fluid film of the lubricant supposedly separates the journal from the bearing. As ZN/P decreases, f decreases until a minimum point is reached, to the left of which f rises rapidly in the region of *unstable lubrication*[3] where the film of the lubricant has become so thin that its mechanical action is no longer determined by the property of viscosity alone, as ordinarily measured.

In the region of stable lubrication the shape of the curve for a symmetrically loaded bearing is affected by the ratio of clearance to diameter, C/D; the ratio of length to diameter, L/D; and the deviation of the surfaces of journal and bearing from true cylindrical form. The effect of the amount of lubricant supplied to the bearing

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[2] Hersey, M. D., Laws of Lubrication of Journal Bearings, Trans. A.S.M.E., vol. 37 (1915), pp. 167–202; *Jl. Wash. Acad. Sci.*, vol. 4 (1914), pp. 542–552; Problems of Lubrication Research, *Jl. Am. Soc. Naval Engrs.*, vol. 35 (1923), pp. 648–674; Lubricants, *Proc. Railway Club of Pittsburgh*, vol. 25 (1926), pp. 174–183. Havre, H., Etude théorique et pratique sur le graissage, *Le Génie Civil*, vol. 90 (1927), pp. 45–48.

[3] Wilson, R. E., and Barnard, D. P., 4th, Mechanism of Lubrication, *Jl. S.A.E.*, vol. 11 (1922), pp. 49–60.

[4] McKee, S. A., Effect of Kerosene on Oiliness of Lubricating Oils, *Jl. S.A.E.*, vol. 19 (1926), pp. 356–360; Performance of Journal Bearings When an Abrasive Is in the Lubricant, *Jl. S.A.E.*, vol. 20 (1927), pp. 3–6.

probably is negligible except where the supply is insufficient to maintain a complete film or where the pressure at which the oil is supplied is high enough to materially affect the lines of flow of the oil in the bearing.

It is probable that the point of minimum friction and the portion of the curve at the left are affected by these same factors and in addition by the oiliness[5] of the lubricant, the materials of which the journal and bearing are made, and the roughness of the working surfaces. The effect of changes in this latter factor due to running in was the object of study in this paper.

The Friction Machine and Its Operation[6]

A photograph of the friction machine used in this work is shown in Fig. 2, and one of the complete set-up in Fig. 3. The machine consists of four connecting rods of an automobile engine, with the "big end" bearings, serving as test bearings, mounted on a steel shaft set in a lathe. These rods are fastened to a frame by means of eyebolts and clevises in such a manner that they lie in a horizontal plane with the two end bearings on the opposite side of the shaft from the two in the middle. The frame is suspended by two equalizers mounted on a cross-beam fastened to the frame just above the shaft. Load is applied to the bearings by compressing the calibrated coil springs mounted on the sliding eyebolts fitted to the end rods.

Oil is fed to the center of the unloaded sides of the bearings by lines of rubber tubing from a glass bottle. The oil is forced from the bottle by the house air pressure of about 7 centimeters of mercury.

The working temperature of the bearings is measured by copper-constantan thermocouples soldered to the loaded sides of the second and fourth bearings. Temperature control is provided by circulating water through the hollow test shaft by means of a small motor-driven gear pump connected to a 20-gal. supply tank.

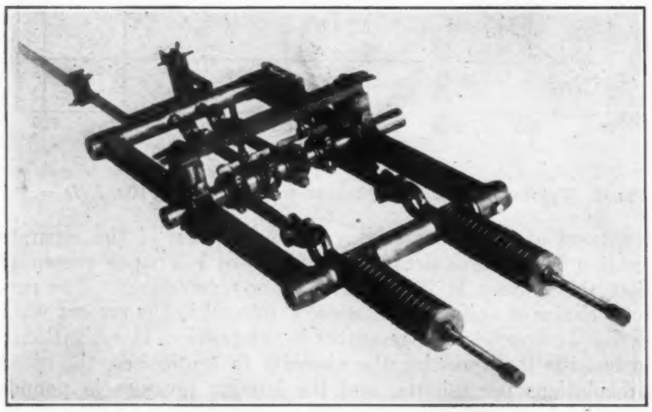

Fig. 2 The 4-Bearing Friction Machine (Essential Parts)

In making a test run, oil is fed to the bearings and the machine brought to steady conditions under a predetermined load and speed to give the desired value of ZN/P. Under these conditions the bearings and frame act as a rigid unit which tends to rotate around the axis of the shaft because of the frictional torque set up in the bearings. A determination of the frictional torque can therefore be made by noting the positions of the two counterpoises mounted on the graduated beams, necessary to bring the frame to balance in a horizontal plane, as indicated by the spirit level, with the shaft rotating first in one direction and then in the other. The difference between the average of two readings taken when the shaft is rotating in one direction and the average of two readings taken when the rotation of the shaft is reversed is equal to twice the average frictional torque of the four bearings. In order to prevent injury to the shaft or bearings when reversing, the motor for driving the lathe is quickly reversed by throwing a switch before the test shaft comes to rest. In order to eliminate any error due to the possible dragging effect of the oil lines, readings of the position of the counterpoises necessary to bring the frame to balance with the shaft rotating in a given direction, are taken with the frame tipped at the start alternately in opposite directions.

Description of the Bearings and Journals Tested

The first set of bearings tested had been used in a previous investigation where a small amount of abrasive had been present in the lubricant. It is probable that on the whole their bearing surfaces were more nearly regular than those with the usual stock finish. They had the dull appearance, however, typical of a soft-metal surface that had been lapped. The nominal diameter of these bearings was 1.25 in. and their nominal length 1.25 in. The average clearance (difference of diameters) was about 0.0027 in., making the clearance-diameter ratio C/D about equal to 1/450. The approximate composition of the babbitt-metal lining was 85 per cent tin, 7.5 per cent copper, and 7.5 per cent antimony.

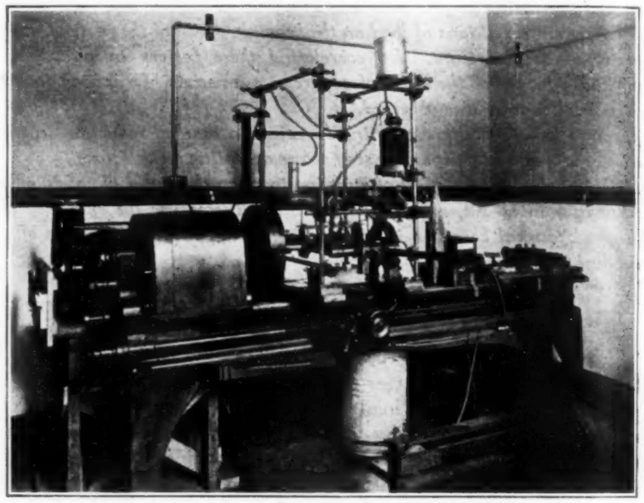

Fig. 3 General View of the Friction Machine

The test shaft also had been used in previous investigations and it appeared to be quite highly polished at the journals. It was made of a high-carbon–tungsten tool steel, oil-quenched at 1550 deg. fahr. and tempered 30 min. at 900 deg. fahr., and had a Brinell hardness of about 350.

In a second test a new set of bearings of the same kind as the first set was used. These, however, were finished with a special type of commercial reamer which provided a smoother, more accurate bearing surface than the usual stock finish. The ends of the bearings were machined so that their length was 1.250 ± 0.001 in. Their average diameter was 1.25098 in., the maximum variation in diameter being 0.00015 in. The measurements of diameter were made with a special type of commercial internal micrometer and were accurate to better than ±0.0001 in. The average clearance was 0.00056 in., making the average clearance-diameter ratio about 1/2250.

A new shaft was used for this test. It was made of a high-carbon–tungsten tool steel, its heat treatment being: heated at 1500 deg. fahr., held for 30 min., quenched in oil, reheated at 850 deg. fahr. for 45 min., and air cooled. It had a Brinell hardness of about 179. After treatment it was ground and lapped. The average diameter of the shaft at the journals was 1.25042 in., the maximum variation in diameter being 0.00017 in., these values being correct within ±0.00005 in.

The Lubricants Used

In testing the first set of bearings the lubricant used in most of the runs was a medium mineral motor oil having a viscosity of 293 sec. Saybolt Universal at 100 deg. fahr. In the second, fourth, and eighth runs, however, this was changed to a medium motor oil containing about 4 per cent of fatty oil, and having a vis-

[5] Two oils are said to differ in the property of *oiliness* if they possess the same viscosity at the temperature of the film and yet give different amounts of friction in the bearing. Cf. Kingsbury, A., A New Oil-Testing Machine and Some of Its Results, Trans. A.S.M.E., vol. 24 (1903), pp. 143–160; Report of Special Research Committee on Lubrication, A.S.M.E., Mechanical Engineering, vol. 41, June, 1919, p. 537; Herschel, W. H., Viscosity and Friction, *Jl. S.A.E.*, vol. 10 (1922), pp. 31–41.

[6] For a more detailed description see paper by author (previously cited) *Jl. S.A.E.*, vol. 20 (1927), pp. 3–6.

cosity of 279 sec. Saybolt Universal at 100 deg. fahr. The average running temperature when using the mineral oil was about 80 deg. fahr. and the absolute viscosity of the oil at this temperature was about 104 centipoises. The average running temperature when using the blended oil was about 77.5 deg. fahr., the absolute viscosity of this oil at that temperature being in the neighborhood of 107 centipoises.

The lubricant used throughout the second test was a mineral spindle oil having a viscosity of 126 sec. Saybolt Universal at 100 deg. fahr. The average running temperature was about 73 deg.

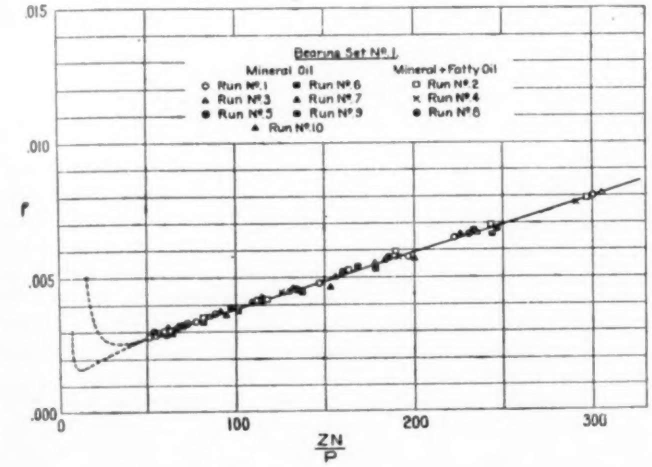

FIG. 4 EFFECT OF PROGRESSIVE AMOUNTS OF RUNNING IN ON THE COEFFICIENT OF FRICTION OF BABBITTED BEARINGS; UPPER VALUES OF ZN/P; $C/D = 1/450$

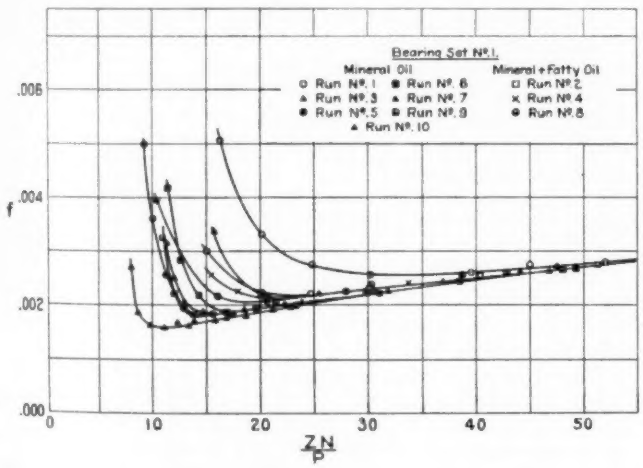

FIG. 5 DETAILED OBSERVATIONS AT THE LOWER VALUES OF ZN/P; $C/D = 1/450$

fahr., and the absolute viscosity of the oil at this temperature was about 47 centipoises.

PROCEDURE IN TESTING

All runs were made in the decreasing order of ZN/P. The first point of a run was obtained by using a light load combined with a high speed, and the succeeding points were obtained either by decreasing the speed or increasing the load.

The total load per bearing ranged from 100 to 300 lb. and from 50 to 300 lb. for the first and second set of bearings, respectively, and the corresponding speed ranges were from 15 to 300 r.p.m. and 15 to 500 r.p.m., respectively. A typical data sheet is shown in Table 1.

The first five runs of the first test were completed with no running in between runs, the effect produced by each run in itself being sufficient to show a change in the curve for the succeeding run. In connection with all subsequent runs, however, some running in was done between runs at a value of ZN/P below that at the point of minimum friction for the preceding run.

TABLE 1 TYPICAL DATA FROM A "RUNNING IN" TEST

(Bearing set No. 2; run No. 8; lubricant, spindle oil; journal diameter, $D = 1.2504$ in.; $C/D = 1/2250$; $L/D = 1$)

Duration of observation, min.	Average speed of journal, N, r.p.m.	Total load per bearing, PLD lb.	Temperature of bearings, deg. cent.	Viscosity of lubricant, Z, centipoises	Frictional torque per bearing, lb-in.	Coefficient of friction, f	Value of ZN/P
6.0	428.0	51.3	25.75	40.2	1.885	0.0588	525
9.5	303.6	51.3	24.8	42.3	1.416	0.0442	391
7.0	186.8	51.3	24.40	43.2	0.924	0.0288	246
14.0	107.2	51.3	24.15	43.6	0.581	0.0182	142
14.5	161.4	100.7	24.4	43.2	0.851	0.0135	108
7.5	109.3	100.7	24.15	43.6	0.606	0.00964	74.0
8.0	69.6	100.7	23.9	44.2	0.425	0.00676	47.8
9.5	39.10	100.7	23.9	44.2	0.274	0.00436	26.8
6.5	22.95	100.7	23.9	44.2	0.184	0.00292	15.8
8.0	56.35	300.2	28.0	35.9	0.424	0.00226	10.5
8.0	40.50	300.2	28.0	35.9	0.373	0.00198	7.56
8.0	32.05	300.2	28.0	35.9	0.340	0.00181	5.98
7.5	25.55	300.2	28.0	35.9	0.333	0.00178	4.78
7.5	20.35	300.2	28.0	35.9	0.331	0.00176	3.80
7.5	17.75	300.2	27.95	36.0	0.365	0.00194	3.33
7.5	16.15	300.2	27.95	36.0	0.398	0.00211	3.02
6.0	14.70	300.2	27.95	36.0	0.498	0.00265	2.75

GRAPHICAL PRESENTATION OF RESULTS

The f-(ZN/P) curves including all the observations taken during the tests on the first set of bearings are shown in Figs. 4 and 5. The first diagram, Fig. 4, covers the upper part of the ZN/P range and Fig. 5 the lower. The corresponding curves for the tests on the

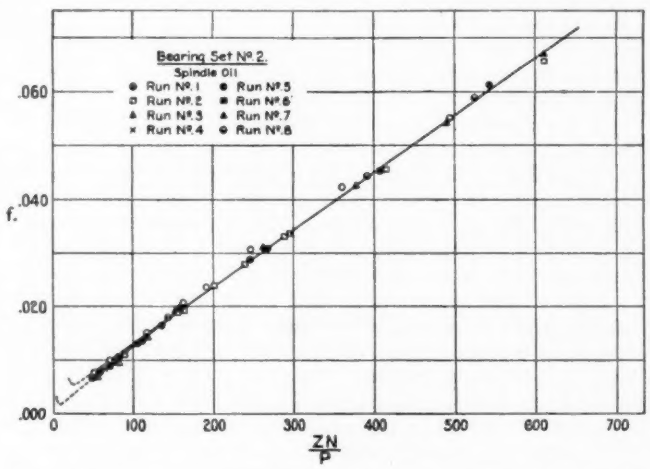

FIG. 6 EFFECT OF PROGRESSIVE AMOUNTS OF RUNNING IN ON THE COEFFICIENT OF FRICTION OF BABBITTED BEARINGS; UPPER VALUES OF ZN/P; $C/D = 1/2250$

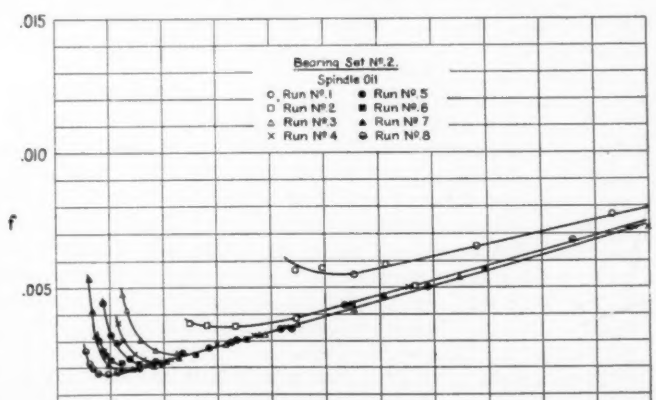

FIG. 7 DETAILED OBSERVATIONS AT THE LOWER VALUES OF ZN/P; $C/D = 1/2250$

second set of bearings are shown in Figs. 6 and 7. In Fig. 8 the initial and final curves are reproduced covering the complete range of ZN/P values for both sets of bearings. The shaded portion represents the total change in bearing performance due to running in, so far as these tests were carried.

It will be noted from Figs. 4 and 6 that the effect of running in was practically negligible at the higher values of ZN/P in the region

of stable lubrication, since in each diagram all the points lie approximately on the same line.

Figs. 5 and 7 appear to show two distinct effects at the lower values of ZN/P. The more conspicuous effect is the progressive decrease in the value of ZN/P at the point of minimum friction due to continued running in. The other effect is the occurrence of a slight increase in the slope of the curves for the later runs at ZN/P values just above the point of minimum friction.

General Discussion of Results

(a) *Possible Explanations of the Results Obtained.* The decrease in the value of ZN/P at the point of minimum friction with an increase in the amount of running in, as shown in Figs. 5 and 7, can be explained by the burnishing action of the journals on the high spots of the bearings, causing a smoothing of the surfaces.

There are two possible explanations for the slight increase in slope of the curves for the later runs at ZN/P values just above the point of minimum friction.

One suggestion is that certain high spots on the bearings come in contact with the journals before the point of minimum friction is reached, and any smoothing effect on these spots would tend to lower the friction at these values of ZN/P.

The other suggestion is that the burnishing action of the journals on the bearings has changed the overall shape of the bearing surface, to a slight extent. This would have an effect on the cross-section of the oil film for any given value of ZN/P, which in turn would affect the form of the f-(ZN/P) curve.

It is quite possible that a very slight change in the shape of the bearing surfaces, such as would have practically no effect on the curve at the higher values of ZN/P, where the journals are running more nearly concentric with the bearings, might yet have a measurable effect at the lower values of ZN/P, where the journals have a more eccentric position. In other words, those parts of the surfaces of the bearings that were burnished by the journals suffered a slight change in contour tending to make their radii more nearly equal to the radii of the respective journals; this slight change might have practically no effect on the curves at the higher values of ZN/P, where the minimum thickness of the oil film is relatively quite large, yet it might have a measurable effect at the lower values of ZN/P where the minimum thickness of the film is small.

An effort was made to check up on the foregoing question by measuring the bearings after the test, but it was found that the change in effective diameter, if any, was less than could be detected by the measuring instrument.

(b) *Relation of Shift in the Minimum Point to the Total Frictional Work Done.* Sufficient data had been taken during the tests to compute the frictional work done on the bearings in obtaining each point on all the curves.

For example, the following data were used for determining the frictional work done on the bearing in obtaining the last point of the eighth run of the test with the second set of bearings (Table 1): coefficient of friction, $f = 0.00265$; load, 300.2 lb.; therefore equivalent frictional force at surface of bearing $= 0.00265 \times 300.2 = 0.795$ lb. Circumference of journal $= 1.25\pi/12 = 0.327$ ft.; duration of observation, 6 min.; revolutions per minute of journal 14.7; total number of revolutions during the observation $= 6 \times 14.7 = 88.2$; total distance traveled by surface of journal $= 88.2 \times 0.327 = 28.8$ ft. Therefore the total frictional work done by journal $= 28.8 \times 0.795 = 22.9$ ft-lb.

These results have been shown in Fig. 9 by plotting the total frictional work per bearing, when operating in the region of unstable lubrication previous to each run, against the value of ZN/P at the point of minimum friction.[7]

A given amount of frictional work when operating at one load and speed may have a different smoothing effect on the bearings than the same amount of frictional work when operating at other loads and speeds; it should of course be noted that the curves do not take this into account. It is also possible that some smoothing action takes place at ZN/P values above that at the point of minimum friction. The curves nevertheless indicate that as the running in progresses, it requires an increasing amount of frictional work to effect a given change in the value of ZN/P at the point of minimum friction. They are also an aid in estimating the approximate value of ZN/P at the point of minimum friction where, for practical purposes, the bearings can be considered thoroughly run in. The limiting values of ZN/P will of course be different for bearings of different C/D or L/D ratios, or which are otherwise not geometrically similar. Thus for these particular bearings the practical limiting value of ZN/P at the point of minimum friction may be taken roughly equal to 6 for the first set ($C/D = 1/450$) and about 3 for the second set ($C/D = 1/2250$).

This question of the total amount of running in that may be considered practically desirable is, of course, in the end a matter for individual estimate, Fig. 9 serving only as an indication by means of which this estimate can be formed.

(c) *The Effect of Fatty Oil.* From the curve in Fig. 9 it will be seen that the points representing the runs where the blend of mineral and fatty oils was used fall slightly to the left of the general trend of the curve. This is an indication that this lubricant exhibited the tendency that has been shown in other experiments[8] to lower the value of ZN/P at the point of minimum friction. The fact that the points representing the runs immediately following the runs where the blended oil was used fall back to the curve again, however, would seem to indicate that the blended oil did not show any strikingly increased efficiency in the running in process over the straight mineral oil. It also shows that there was little if any tendency for the high oiliness factor to persist after the blended oil had been removed. Another point is that the effect of a small amount of frictional work seems to far overshadow the effect of high oiliness of the lubricant except where the bearings are well run in. It should be noted, however, that the percentage of fatty oil in the blend was rather low, and it is possible that if a blend with a higher percentage of fatty oil had been used the effect would have been greater than is shown by these tests.

(d) *Comparison of the Two Sets of Bearings.* One reason for testing the second set of bearings was to make sure that the effects shown by the first set did not result from the particular condition of the bearing surface or from the use of the blended oil, and it will be noted that the performance of the second set (Figs. 4 and 5) is of the same general nature as that of the first set (Figs. 6 and 7). The same effect, namely, a marked decrease in the value of ZN/P at the point of minimum friction with an increase in the amount of running in, is exhibited, as well as the slight increase of slope in the curves for the later runs at ZN/P values just above the point of minimum friction.

It is probable that the major reason for the difference between 32.5, the value of ZN/P at minimum friction for the first run with the first set of bearings, and 26, the value of ZN/P at minimum friction for the first run with the second set, is the difference in roughness of the bearing surfaces. The difference in clearance-diameter ratios, and the difference in variation from true cylindrical surfaces between the two sets of bearings, may also have had some effect. The two latter factors probably are the ones that have the most weight in causing the difference between 6 and 3, the estimated ZN/P values at minimum friction for the well run in condition in the respective tests.

Fig. 8, in which are plotted the f-(ZN/P) curves for the two sets of bearings, brings out the effect of the clearance-diameter ratio on the slope of the curves in the region of stable lubrication. It is of interest that the effect shown by these curves is not only in the same direction but also of about the same order of magnitude as suggested by theoretical curves for bearings free from end leakage.[9]

[7] It is realized that some of this frictional work is developed by viscous shear of the lubricant. The actual physical conditions, when the bearing is operating below the minimum point, however, are unknown, and thus it is impossible for the present to differentiate between the amount of work useful in smoothing the surface and the amount used in shearing the lubricant in the bearing.

[8] Barnard, D. P., 4th, Myers, H. M., and Forrest, H. P., The Effect of Oiliness on the Behavior of Journal Bearings, *Ind. & Eng. Chem.*, vol. 16 (1924), pp. 347–350.

[9] Sommerfeld, A., Zur Hydrodynamischen Theorie der Schmiermittelreibung, *Zeit. für. Math. u. Phys.*, vol. 50 (1904), pp. 97–155.

Howarth, H. A. S., A Graphical Study of Journal Lubrication, Trans. A.S.M.E., vol. 45 (1923), pp. 421–448; Part II, vol. 46 (1924), pp. 809–832; Part III, vol. 47 (1925), pp. 109–114; reprinted by The American Society of Mechanical Engineers, 29 West 39th Street, New York, N. Y.

(e) *The Factor of Safety in Bearing Operation.* Before considering the relationship of the results of these tests to the performance of bearings in actual service, the significance of the value of ZN/P at the point of minimum friction should be further emphasized. It will be noted that when a bearing is operating in the region where the value of ZN/P is above the point of minimum friction, any increase in friction would tend to raise the temperature of operation, which in turn would lower the viscosity of the lubricant with a resultant lowering of friction. Thus there is a tendency toward the reaching of an equilibrium condition when the load and speed are steady, hence the name "region of stable lubrication" to which reference was previously made. In that region the bearing operates in safety so long as the operating temperature is low enough to prevent flow of the bearing metal, too great a decrease in clearance due to expansion, or too rapid oxidation of the lubricant. In the region where the value of ZN/P is below the point of minimum friction, an increase in friction would tend to raise the temperature. This would lower the viscosity of the lubricant as before, which, however, in this region, as indicated by the reversed slope of the curve, would tend to increase the friction.

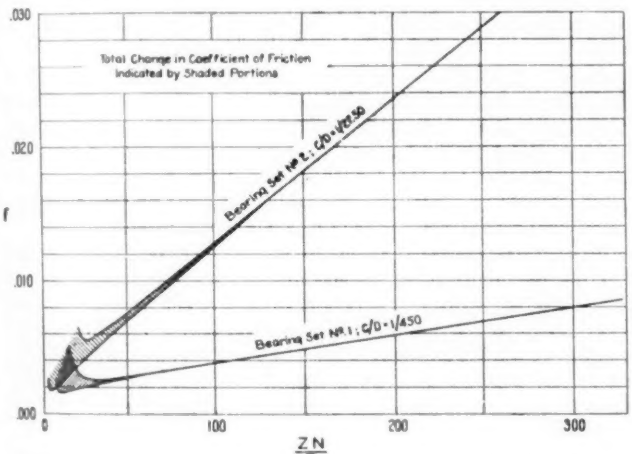

FIG. 8 EFFECT OF RUNNING IN ON BEARING PERFORMANCE

Thus the effect is cumulative and eventually the bearing would fail, hence the name "region of unstable lubrication." Therefore the value of ZN/P at the point of minimum friction, since it is the boundary between the two regions, becomes significant in determining the factor of safety under which a bearing is operating. Suppose, for example, a bearing were operating under stable conditions such that the value of ZN/P was 100, and the value of ZN/P at the point of minimum friction for this bearing was 20, the bearing would be operating with a factor of safety of 100/20 or 5, for the severity of operating conditions would have to increase in this ratio before the unstable condition was reached.

Thus running in, by reducing the value of ZN/P at the point of minimum friction as is indicated in Fig. 9, tends to increase the factor of safety of a bearing when operating with a given load, speed, and lubricant.

(f) *An Example of a Possible Saving in Power.* It is difficult to estimate the significance of this increase in the factor of safety when dealing with bearings where the speed is changing and where the load is changing both in intensity and direction. There are bearings, however, notably in steam turbines and electric motors, where the conditions of operation remain practically constant over long periods of time. It may be of interest to point out the possibility that the running-in effect might be put to use in reducing the friction losses of such machines.

Suppose, for example, that a turbine bearing 6 in. in diameter, 8 in. long, and having a C/D ratio of 1/1000 is running at a speed of 3600 r.p.m. with a total load of 3840 lb., at an operating temperature of 130 deg. fahr., the lubricant being an extra light turbine oil with a viscosity of 150 sec. Saybolt Universal at 100 deg. fahr. The absolute viscosity at the operating temperature would therefore be about 13.5 centipoises. While these conditions are not taken from a bearing in actual operation, it is believed that they are not far from normal for a bearing of this type.

Let it be assumed that the f-(ZN/P) curve shown in Fig. 1 is the approximate curve for this bearing. This curve has been derived from experimental curves with other C/D ratios by taking proper account of the effects of changes in this ratio as exhibited by theoretical curves based on Sommerfeld's equations. Another assumption is that the range in the value of ZN/P at minimum friction for different degrees of running in will be from 30 to 4 for this bearing.

Under the assumed initial conditions, the bearing will be operating at a value of ZN/P of about 600. From the curve in Fig. 1 the coefficient of friction is 0.0306, which would make the frictional loss of the bearing 20.1 hp. The factor of safety when the bearing was new would be 600/30 or 20.

It would seem that a factor of safety of about this magnitude, or say 25, would be ample for this bearing as it would permit doubling the load, reducing the speed to one-third its normal value, and increasing the operating temperature to about 220 deg. fahr. before bringing conditions to a point where the bearing is operating in the region of unstable lubrication.

If now the bearing is run in until the value of ZN/P at minimum friction is reduced to 4, conditions could be changed, by using an oil of lower viscosity or by decreasing the length of the bearing, so that the value of ZN/P under normal running conditions is reduced from 600 to 100, while the factor of safety is equal to 25, a slightly higher value than when operating under the original conditions. The curve in Fig. 1 shows that in this final condition the coefficient of friction is only 0.0067, which would reduce the frictional loss of the bearing from 20.1 to 4.4 hp.

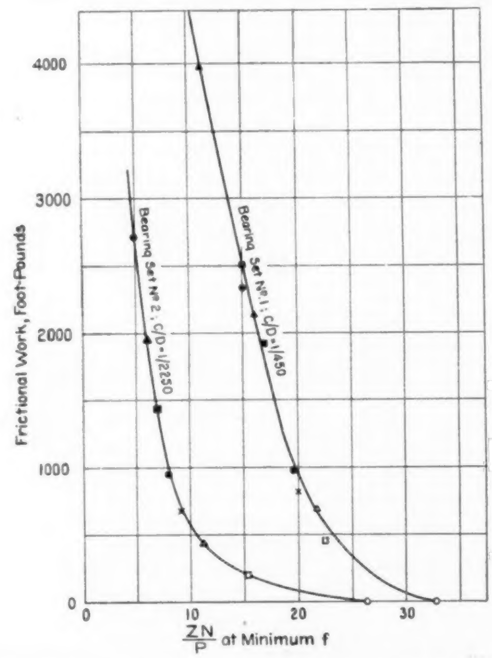

FIG. 9 RELATION BETWEEN LOCATION OF MINIMUM POINT AND FRICTIONAL WORK DONE ON BEARING

Thus it appears that on this bearing a decrease in the frictional loss of about 15.7 horsepower[10] could be made by a thorough running in without decreasing the factor of safety. While this gain is only a small percentage of the output of a turbine that would use a bearing of this size, yet it would probably be a worthwhile saving from a dollars-and-cents viewpoint, not to mention the advantage of having less heat to carry away.

[10] Since the slope of the f-(ZN/P) curve in the region of stable lubrication is dependent upon the C/D ratio, it is evident that the saving as given in this example would be different for bearings with different C/D ratios, and that it would be less when C/D is greater and greater when C/D is less. The power saving will vary somewhat less than in the inverse ratio of C/D. The particular value of C/D = 1/1000 is given as typical for this kind of bearing by Thomsen, T. C., The Practice of Lubrication, Second Edition, 1926, McGraw-Hill Book Co., Inc., New York, p. 103; and by Wilson, R. E., and Barnard, D. P., 4th, The Mechanism of Lubrication (previously cited): see Table 1, p. 59.

Conclusion

The results of this investigation tend to emphasize the significance of surface conditions in the study of incomplete film lubrication. Thus in any experimental work where the object is to find the difference in the oiliness of lubricants, or to find a combination of lubricant and metals that would be most efficient for use in a bearing where a complete film of lubricant cannot be maintained, the condition of the surfaces, unless particular precaution is taken, may mask the other factors and lead to erroneous conclusions.

The tests indicate that the chief effect of running in is the decrease in the value of ZN/P at the point of minimum friction, which is significant in that it increases the factor of safety under which the bearing is operating.

The hypothetical example of a turbine bearing shows how it may be possible to put the running-in effect to use in saving power in high-speed machinery. It should be realized that it would not be justifiable to predict that such a saving could always be made, since the numerical values here employed are based on a very limited series of tests. The results, however, indicate a promising field for further research on journal-bearing lubrication, with especial reference to factors affecting the smoothness of the bearing surfaces.

Methods of Determining the Strength of Pipe Flanges

Discussion of Proposed Formulas for Strength and Deflection of Rings—Proposed Method for Determining Strength of Hubbed Flanges—Comparison of Proposed Methods with Those in Common Use

During the Session on Central Station Power, held under the auspices of the Power Division of the A.S.M.E. at the White Sulphur Springs Meeting of the Society, May 23 to 26, 1927, and presided over by W. L. Abbott,[1] a very interesting paper on the subject of The Strength of Pipe Flanges, by Everett O. Waters and J. Hall Taylor, was presented. The paper discussed approximate methods of determining strength, proposed formulas for strength and deflection, recommended proportions of flat rings, proposed method for determining strength and deflection of hubbed flanges, discussed tests on hubbed flanges, and recommended proportions of hubbed flanges. It appeared in full in the Mid-May, 1927, issue of Mechanical Engineering, page 531. Considerable interest in the methods proposed was manifested by those who had either read the paper or heard it presented, with the result that the discussion was unusually spirited. Much of the written comment was backed up with figures and calculations of some length.

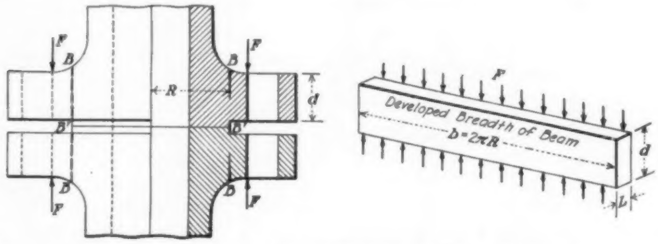

Fig. 1 Stress Conditions in Ring Section B-B′ of Raised Face and Van Stone Flanges

Formula used in Determination of Maximum Stress in Circular Section B-B′.

$$p = \frac{6 \times F \times L}{b \times d^2} = \frac{6 \times a \times L \times t}{b \times d^2}$$

where p = stress in pounds per sq. in.
6 = constant from section modulus
F = force in pounds = at
a = total bolt root area sq. in.
t = bolt tension pounds per sq. in.
L = moment arm from inner edge of bolt hole to section B-B′
b = breadth of beam = $2\pi R$
d = depth of beam = flange thickness.

The first written contribution was by Sabin Crocker[2] who considered it of interest that the authors had used the St. Venant theory of maximum strain as the criterion of failure rather than the more usual one attributed to Rankine. The distinction between these two theories, he wrote, might be stated as follows:

Rankine assumed that the criterion for the failure of a material was for the maximum normal stress to exceed a certain limit. In other words, if more than one stress, such as hoop or radial stress existed, the larger of these two principal stresses was the determining factor. It had been rather general practice in the past, he pointed out, to calculate the strength of any structural or machine part, with reference to the weakest section, by passing a plane through that section normal to the direction of the principal stress and determining the maximum intensity of stress per unit area. It should be noted, he added, that the principal stress might be the algebraic sum of two or more stresses normal to the section plane, as explained in connection with Fig. 3 of the discussion.

St. Venant assumed that the criterion for the failure of a material was for the maximum strain to exceed a certain limit; the maximum strain being, of course, a function of the two principal stresses, Poisson's ratio, and the modulus of elasticity. That was the assumption adopted by Waters and Taylor, he pointed out, and he considered them entitled to a great deal of credit for the painstaking manner in which they had fitted an involved formula in a particularly difficult application.

The analyses proposed by Crocker and Sanford, and by Tanner, applied in the determination of the Rankine criterion in the particular sections which they had designated. Waters and Taylor, he explained, were in error on the second page of their paper (page 532) in trying to make a direct comparison between the maximum intensity of stress in a 14-in. Van Stone flange as determined by the three different formulas there mentioned. The points at which these stresses were computed were located in entirely different sections through the flange, and there was no reason at all why the intensity of stress at these points should coincide unless the flange were designed for 100 per cent uniformity of maximum stress in all sections, a condition which was not true in the case under discussion. It was explained that in correctly designing a Van Stone flange in accordance with the Rankine theory, it was necessary to consider the maximum stress existing in at least two different sections in neither of which should the maximum normal stress exceed a safe limiting value. The Crocker and Sanford method was developed for use in determining safe proportions for the hubs of Van Stone flanges, while the Tanner method was only applicable to the determination of safe proportions for the ring part of the flange. Both methods might be applied to their corresponding sections in either flat or hubbed flanges.

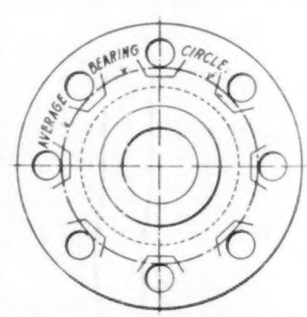

Fig. 2 Shifting Action of Points of Application of Bolt Forces upon Deflections

(Bolt forces are considered as acting at inner edge of bolt holes rather than on bolt circle, because as deflection takes place the load is no longer uniformly distributed on the under side of the nuts. This is shown by the imprints of the nuts as illustrated above. The circle tangent to the inner edge of the bolt holes was taken as being a more representative load line for the average condition of loading.)

A similar line of reasoning, according to the writer, applied to flanges cast integrally with fittings, where again each particular

[1] Chief Operating Engineer, Commonwealth Edison Co., Chicago, Ill. Past-President, A.S.M.E.

[2] Designing Engineer, Detroit Edison Co., Detroit, Mich. Mem. A.S.M.E.

application must be analyzed to locate the weak sections. Two weak sections through flanges cast integrally with thick-walled fittings are illustrated in Figs. 1 and 3. The method of analysis and the formula for calculating the maximum stress is indicated in each figure.

The writer felt that the application of St. Venant's theory to the analysis of pipe flanges should lead to a better appreciation of the deformations occurring within the flange structure. The substitution of maximum strain in place of maximum normal stress as the criterion for the failure of a material was in harmony with the existing tendency in engineering practice where a more exact analysis was desired than that furnished by the common or Rankine theory.

A consideration of the problem of determining the strength of pipe flanges disclosed, however, certain factors which by their nature were indeterminate. The bolt forces were considered as acting on the circumference of the bolt circle, although as deflection took place the load was no longer uniformly distributed on the under

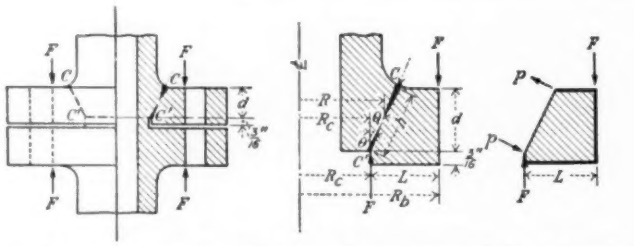

FIG. 3 STRESS CONDITIONS IN DIAGONAL RING SECTION C-C′ OF FLANGED FITTING. SMALL MALE-FEMALE TYPE OF JOINT

The formula developed below for calculating the maximum stress obtaining in the diagonal ring section C-C′ is particularly applicable to the small male-female fittings, but can be applied equally well to any fittings which are suspected of being weak in this section. An isometric view of a unit length of section C-C′ is given in Fig. 3-A.

The symbols used in the development of the formula are (see Fig. 3):

p = stress in pounds per square inch
F = at = total bolt load in pounds
a = total bolt area at root of threads, square inches
t = bolt tension, pounds per square inch
L = $R_b - R_e$ = moment arm of external force couple composed of bolt forces and gasket reactions
R_b = radius of a circle tangent to inner edge of bolt holes
R_e = outer radius of small female
R = $R_e + Q$ = radius of mean circle
Q = $\sin\theta\, h/2$ (see Fig 3)
h = $\dfrac{d}{\cos\theta}$ = depth of section C-C′
θ = angle between center line of fitting and slope of section C-C′. (This angle may be obtained by laying out flange to scale and assuming a fillet radius)
d = flange thickness minus depth of female (= $^3/_{16}$ in.) in the case of the small male-female fittings.

From the above relations it follows that the total bolt load acting upon the flange is

$$F = at$$

The bolt forces and resisting stresses may be found per unit length of the circumference of the mean circle of radius R by dividing the total forces and stresses by $2\pi R$.

The external moment of the couple composed of the bolt forces and the equal and opposite gasket reaction per unit length of the mean circumference is:

$$M = \frac{F}{2\pi R}L = \frac{atL}{2\pi R}$$

The moment of resistance of the rectangular section of depth h per unit length of the mean circumference is the product of the section modulus and the maximum stress in the outer fibers of the flange material:

$$M = p\frac{I}{C} = p\frac{bh^2}{6} \text{ (See Marks', Second Edition, p. 416)}$$

Substituting the value of $h = \dfrac{d}{\cos\theta}$

$$M = p\frac{bd^2}{6\cos^2\theta}$$

Equating the external and internal moments and noting that for a unit length of the mean circumference b the breadth of the section is equal to unity, the following equations result:

$$\frac{pd^2}{6\cos^2\theta} = \frac{atL}{2\pi R}$$

or

$$p = \frac{6\cos^2\theta\, atL}{2\pi Rd^2}$$

$$p = 0.96\cos^2\theta\frac{aL}{Rd^2}t$$

side of the nuts, but shifted toward the inner edge of the bolt holes. This condition, he said, was clearly borne out in tests where the imprint of the nuts had been distinctly left in the flange material, as illustrated in Fig. 2. The latter condition, he maintained, represented more nearly the true condition of loading which would obtain as the point of failure was approached. To the writer, it appeared that in the method of loading used by the authors in their 1926 tests the forces actually were applied on the bolt circle throughout deflection, since the plugs were mounted on a ball-and-socket joint and evidently were free to remain normal to the flange face during deflection (see Fig. 18 of the paper). This, he explained, was not in agreement with the usual conditions in an actual flange joint in which the bolts were tightened sufficiently to deflect the flange. The gasket reaction was taken as located at the middle of the raised face. Again, as deflection occurred, there was a tendency for shifting of the line of pressure to the outside of the raised face.

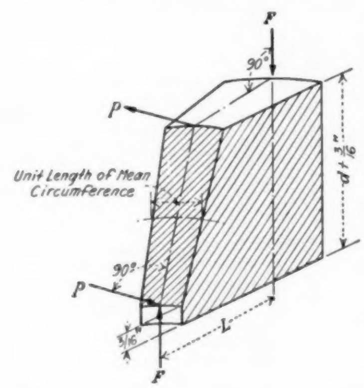

FIG. 3-A ISOMETRIC VIEW OF UNIT LENGTH OF SECTION C-C′ SMALL FEMALE FITTING

(Heavily shaded area represents portion of diagonal ring section C-C′ or the critical section of the small female fitting flange.)

The shortening of the moment arm of the deforming couple, as a result of the shifting of the points of application of the forces noted above, was in the nature of an additional factor of safety, he said, but its magnitude was entirely disproportionate to the refinements persumably obtaining in the use of the formulas developed by the authors. If consideration was given to the shifting of the line of application of the bolt forces, the stress as found for a 14-in. A.E.S.C. 600-lb. W.S.P. Van Stone pipe flange was 75 per cent of that determined under the original assumption of loading. If, in addition, the shifting of the center of pressure of the gasket was taken into account, the stress became only 50 per cent of that initially determined.

This uncertainty as to the true condition of loading, he explained, did not vitiate either the truth or usefulness of the formulas proposed, but it did suggest that the neglect of radial stresses, evidenced in the method employing the Rankine criterion, might not be of as serious moment as was intimated.

Mr. Crocker then explained that in the so-called Crocker-Sanford method, the hoop stress was taken as the criterion of the failure of the material, as it was the principal stress to which the material was subjected. It was a straight-forward application of the Rankine theory, the basis of the greater part of engineering design. Those who had used this method of flange analysis did not maintain that it had any particular theoretical excellence, he said, but they did hold that it was a convenient and satisfactory approximation which was fully as accurate as the uncertainty of loading would warrant. Van Stone flanges, the hubs of which were proportioned in accordance with this method were of well-balanced design and had been found entirely satisfactory in service. In fact, he said, there were many hundreds of these flanges in use in two plants of one company, the aggregate capacity of which amounted to approximately 400,000 kw., without a single instance of failure during periods of service up to six years.

Comparing Equations [1] and [3], he pointed out the fact that they were not identical when applied to a flat ring or a flange with zero hub, as was indicated in the last paragraph on page 538. The constant 0.1169 of Equation [1] was given as 0.177 in Equation [3] (a typographical error, he believed) and r_0 was defined as the inside radius of the ring, or virtual inside edge of the hubbed flange. It was not stated definitely, he said, what dimension was to be used, in an actual analysis, for the virtual inside edge. Fig. 20 indicated r_0 as being to the median line of the hub. If this were correct, he pointed out, then Equations [1] and [3] were not identical, as r_0 would have different values for a flat ring and for a flange with zero or infinitesimal hub. Hence the stresses found for a flat-ring flange and for a flange with an infinitesimal hub differed, although the structures were identical.

The writer had also found what appeared to be inconsistencies and obscure references in the paper. It was not clear just what was meant by the "split flange" referred to in the discussion of J. R. Tanner's method. Also, he said, the statement, middle of page 535, left column, "It will be noted that one source of error in the previous tests has been eliminated," should refer more explicitly

to the Tanner tests to avoid ambiguity. In the last paragraph on page 538 the formula referred to as being identical with Equation [3] should be [1], not [2] as indicated therein. Also, he declared, there was no "American Standard *low hub* flange for 600 pounds working steam pressure," referred to at the top of page 540.

At the bottom of page 535 and the top of page 536 the authors stated that "any pair of rings designed in this manner will be economical of material and at least as strong as the bolts holding them together." Also in the sample problem on page 539 they assumed that the working stresses in both bolts and flange were 14,000 lb. per sq. in. These statements, the writer explained, were made in connection with sample problems where it was probable that the authors did not intend to attach any special significance to this relation between strength of bolts and flange material, yet, he pointed out, such a relation in a high-pressure flange would constitute a serious weakness. Obviously, it was desirable in any case to have the bolts fail before the flange, otherwise there was danger of ruining a valuable fitting or length of pipe through pulling up the bolts too tightly. The use of alloy-steel, heat-treated bolts having a tensile strength of from 100,000 to 150,000 lb. per sq. in. was customary in high-pressure work, while the tensile strength of castings and forged-steel flanges seldom exceeded 75,000. Although it was not intended that the working stress in the bolt material should anywhere near approach the ultimate strength, yet it was easily possible to set up a stress in the bolts which would exceed the yield point of the flange material if both were designed for equal stresses. Under these circumstances, he declared, it would appear good practice to design flanges for a working stress enough lower than the bolt stress to compensate for the difference in strength of the two materials.

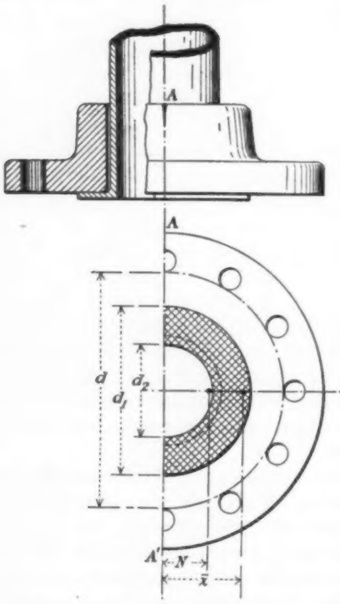

Fig. 4 Stress Conditions in Van Stone Flanges Due to Tightening of Bolts

Crocker and Sanford Method

This method assumes: (1) That the flange may be treated as a beam acted upon by all forces occurring on one side of a diameter; (2) that 1/2 the total bolt load may be considered as concentrated at the center of gravity of a semicircle tangent to the inside edge of the bolt holes; (3) that the reacting forces may be considered as concentrated at the center of gravity of the semi-circular pressure area which is the lapped-over end of the pipe. The maximum stress in the hub is obtained by solving the formula $P = M/J$ where P is the stress sought in lb. per sq. in., M is the product of 1/2 total bolt load in pounds times the distance in inches between the centers of gravity described above $= F/2\,(x - N)$; J is the section modulus of section A-A′ of flange, taken through the bolt holes, in inches cubed. Distance, center of gravity of semicircle to section A-A′ $= x = d/\pi$. Distance, center of gravity of semicircular pressure area to section A-A′ $= N = \dfrac{2(d_1^3 - d_2^3)}{3\pi(d_1^2 - d_2^2)}$

The above discussion, Mr. Crocker wished to assure his hearers, was not advanced in disparagement of the highly valuable theory and test data presented by the authors, but was merely intended to explain the difference between the applications of the theories enunciated by St. Venant and Rankine, and to call attention to practical considerations affecting the conditions obtaining in actual service. From a theoretical standpoint the St. Venant criterion of the authors was more nearly correct, and was in line with the tendency to calculate stress from actual deformation. Furthermore, he said, their test results supported the theory in a very satisfactory manner. However, this solution was under something of a handicap in that it was rather cumbersome to lend itself readily to ordinary engineering calculation, and in that it was difficult to visualize the physical significance of the factors involved in the analysis. For these reasons he believed that the more easily understood analysis and the more ready calculation of the common or Rankine theory would still find favor in many instances. Evidence of this tendency, he pointed out, was given in the case of calculating the bursting strength of pipe, where the inexact Rankine method of attack of Barlow's formula held general preference over the more complicated but exact St. Venant method used in Clavarino's formula.

In conclusion the writer expressed the belief that it might be of interest to those having occasion to calculate stress conditions in pipe flanges to present a more detailed explanation of the methods employing the Rankine criterion than was offered in the introduction to Messrs. Taylor and Waters' paper.

Calling attention to Fig. 1, showing Tanner's method as modified by the writer, applied to a fitting flange, he maintained that the same analysis held in this section as for a Van Stone flange with a substantial hub. In the case of a flat ring, either the original method of Tanner or the modification proposed by Crocker would apply.

Fig. 2 shows the shifting of the points of application of the bolt forces upon deflection.

Fig. 3 shows a modification of the method indicated in Fig. 1 to suit the conditions of a diagonal section existing in a special type of flange with a very narrow recessed gasket.

Fig. 4 shows a solution for stress in the so-called Crocker and Sanford section of a Van Stone flange.

W. P. Wood,[3] also writing, pointed out the fact that the authors had given no information as to the composition or previous treatment of the flanges tested. He felt that these factors would be of considerable importance in connection with the strength of flanges. It would seem, he said, that different results would be obtained with cast steel flanges than with flanges of the Van Stone type. If cast steel flanges were being considered different results would be obtained after various heat treatments to which the metal might have been subjected.

A flange of the best possible design might fail on account of the quality of the material used. Assurance should be had that no weakening or embrittlement of the metal would appear as a result of high working temperatures. An uneven bolt pressure might result in localized stresses and failure. Segregations of oxides and phosphides as well as slag inclusions might cause failure.

While correct design and distribution of stresses were of great importance in steam-line construction, he said, it should not be forgotten that the quality of the metal must be satisfactory if good service was to be assured.

Referring to Method II, page 531, and the statement that only radial stresses were considered in the analysis of flange tests and that hoop stresses were not considered, J. Roy Tanner[4] wrote that this was not literally true, for though not analyzed, hoop stress was recognized and its effect evaluated by means of a constant, which from experiments appeared to hold true over a limited field. No attempt was made to develop a formula for all conditions.

The Working Committee of the A.E.S.C. Sectional Committee on Steel Flanges and Flanged Fittings, he said, was faced with responsibility for the design of the flanges to be used and had a big job with no data and very little time to work. Consequently, the worst conditions were selected and tests run to determine actual yield points to check the proposed design.

The condition selected was one which occurs in practice, but is the worst that can happen; namely, a flat-back flange with the small male face. Any other combination of facing, hub, or attachment to a fitting wall would be correspondingly stronger.

From the behavior of the test flanges it was evident that they followed the lines prescribed by beam formulas, modified considerably, but quite uniformly, by the action of hoop stress over the range of sizes covered. Consequently this modification when the constant was determined produced with simple beam formulas a solution for sizes not tested.

His object in offering his comments, he explained, was to make it clear first that their work was intended to cover only a limited range of flat-back flanges under the worst conditions and that the influence of hoop stress was fully recognized and provided for with the knowledge that the constant developed would probably have a limited application.

F. H. Morehead[5] wrote that while it was true that the formulas

[3] University of Michigan.

[4] Vice-President and General Manager, Pittsburgh Valve, Foundry and Construction Co., Pittsburgh, Pa.

[5] Chief Engineer, Walworth Co., Boston, Mass.

developed were somewhat involved and rather awkward to use, it was to be assumed that the problems involving special flanges would not be frequent because the proposed tentative American Steel Flange Standards would presumably cover the field completely.

In reading the paper he was struck by what he considered an apparent lack of definite information on the actual bolt stresses encountered in making up a pipe joint—the example given on page 539 in which the following statement was made: "The total steam pressure acting on a 15-in. circle is 106,200 lb., so that the total bolt load is 212,400 lb."

He wished to inquire of the authors as to the foundation for this assumption of a total gasket pressure exactly equal to the total internal pressure.

As a result of some rather interesting figures which he had compiled on gasket pressures, as set forth by the tentative American Standards, it was his belief that the unit gasket pressure necessary to make a tight joint had some relation to the unit internal working pressure and that it also varied with the nature of the gasket material used.

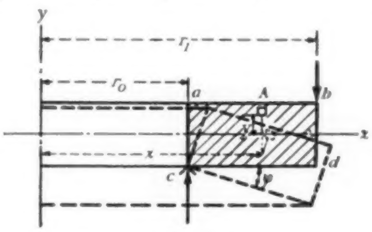

FIG. 5

As an example, he mentioned the 400-lb. Standard. The gasket area on the 4-in. size was 57 per cent of the area circumscribed by the outside diameter of the large male face. On the 24-in. size, however, the gasket area was but 31 per cent of the total area over which the internal pressure was presumed to act. Therefore, he did not consider it sound logic to assume a total gasket pressure equal to the total internal pressure.

He further found that in the proposed tentative American Standards the boltings and gasket areas were not proportioned so that with a given bolt stress a gasket pressure proportionate to the internal pressure was available.

Assuming a bolt stress of 14,000 lb. per sq. in. of net bolt area he found that there was available on the 24-in., 250-lb. Standard a unit gasket pressure of 1950 lb. per sq. in., which was 7.8 times the internal working pressure of 250 lb. per sq. in.

On the 24-in., 600-lb. Standard under the same conditions there was a possible gasket pressure of 2080 lb. per sq. in., or 3.5 times the internal working pressure of 600 lb. per sq. in.

Presumably, he said, the lower figure had been deemed satisfactory. If this were true, he added, the American Standard had apparently wasted a considerable amount of bolt strength and presumably flange strength in the 250-lb. series.

He considered it illogical to have gone to such refinement in the development of a mathematical formula and then, in the use of this formula, to make an assumption as to gasket pressure which might be seriously in error.

S. Timoshenko,[6] also writing, considered the problem discussed in the paper of practical importance not only in calculating stresses and deflections in pipe flanges but in all cases where a circular ring was subjected to the action of twisting moments uniformly distributed along its center line.

FLAT-RING FLANGES

He explained that in the case of a flat ring, such as shown in Fig. 5, Mr. Waters had applied the general theory of bending of circular plates and in this manner had arrived at Equations [1] and [2] of the paper. A much simpler result, he said, could be obtained in this case by using an approximate method, analogous to that mentioned in the paper.

Assuming that under the action of forces shown in the figure the cross-sections of the ring rotated, without distortion, as shown by dotted lines, and denoting by φ the angle of rotation, the radial displacement of any point A, distant y from the *middle plane* of the ring, would be $y\varphi$. Due to this displacement a circumferential unit elongation at A equal to $y\varphi/x$ would occur and the corresponding tensile stress in circumferential direction would be given by,

$$p_t = \frac{Ey\varphi}{x} \quad \ldots\ldots [1]$$

The writer explained that this stress varied directly as the distance y, therefore all stresses over the cross section *abcd* could be reduced to a couple acting in the plane perpendicular to the x axis. The magnitude of this couple would be

$$M = \int_{r_0}^{r_1}\int_{-t/2}^{+t/2} p_t y\,dx\,dy = E\varphi \int^{r_1}\int_{-t/2}^{+t/2} \frac{y^2\,dx\,dy}{x} = \frac{E\varphi t^3}{12}\log_e\alpha \quad \ldots\ldots [2]$$

in which

$$\alpha = \frac{r_1}{r_0} \quad \ldots\ldots [3]$$

The same moment, he said, could be calculated in another way by cutting the ring by diametrial sections such as the xy plane and

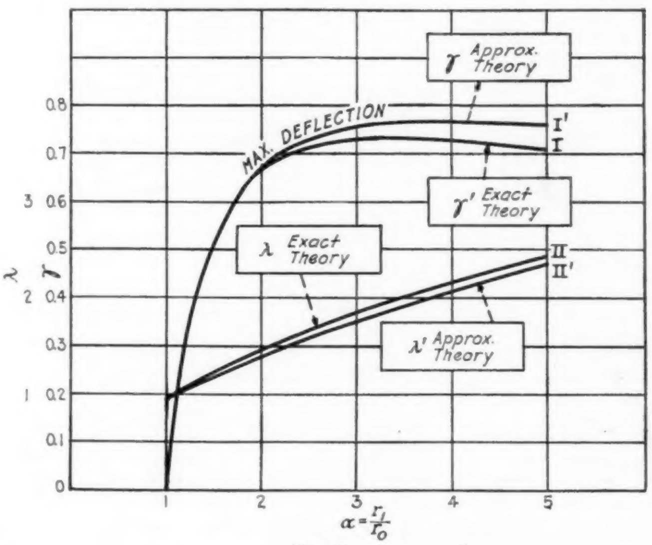

FIG. 6

taking the moment of external forces acting on the half of the ring with respect to the x axis. In this manner one obtained

$$M = \frac{P(r_1 - r_0)}{2\pi} \quad \ldots\ldots [4]$$

where P denotes the total load.

From [2] and [4]

$$\varphi = \frac{6\,P(r_1 - r_0)}{\pi E\, t^3 \log_e\alpha} \quad \ldots\ldots [5]$$

Assuming that the ring was simply supported at the inner edge, the deflection at the outer edge would be

$$y_1 = \varphi\,(r_1 - r_0) = \frac{6P\, r_1^2\,(\alpha - 1)^2}{\pi E\, t^3\alpha^2\log_e\alpha} \quad \ldots\ldots [6]$$

The maximum circumferential stress, he explained, took place at the inner edge of the ring and would be obtained from Equation [1] by substituting $x = r_0$ and $y = t/2$, then

$$(p_t)_{\max} = \frac{3}{\pi}\,\frac{P(\alpha - 1)}{t^2\log_e\alpha} \quad \ldots\ldots [7]$$

Equations [6] and [7] were accurate enough for application and could be used instead of Equations [1] and [2] of the paper in calculating the maximum deflection and maximum stress in flat rings.

In order to show the accuracy of Equations [6] and [7], the writer submitted Fig. 6, showing the deflections and the maximum stresses calculated for various values of α by using these approximate formulas and also by using equations of the circular-plate theory.[7] The deflection at the outer edge of the plate could be represented by

[6] Engineering Mechanics Department, University of Michigan, Ann Arbor, Mich. Mem. A.S.M.E.

[7] These curves were calculated by A. Wahl of the Research Department of Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa.

$$y_1 = \gamma \frac{P r_1^2}{E t^3} \quad \text{[6a]}$$

in which γ is a constant depending on the ratio $\alpha = r_1/r_0$ of the plate.[8] The values of γ calculated from the circular plate theory and from the approximate solution [6] were shown by curves I and I′, respectively. These values are given also in Table 1 below.

The maximum tangential stress, he pointed out, took place at the inner edge of the plate and could be represented by

$$(p_t)_{\max} = \lambda \frac{P}{t^2} \quad \text{[7a]}$$

The values of the constant λ calculated from the plate theory and

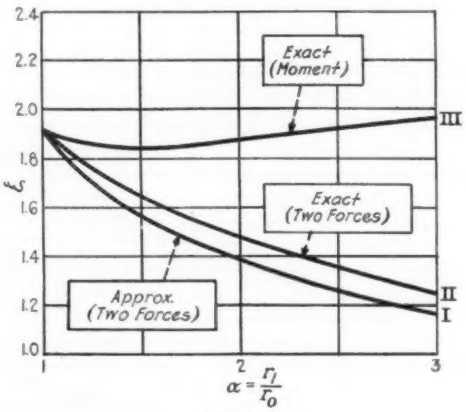

FIG. 7

from the elementary formula [7] are shown in Fig. 6 by curves II and II′, respectively, and are also given in Table 1.

TABLE 1

α	1	1.25	1.5	2	3
γ	0	0.343	0.520	0.674	0.735
γ'	0	0.344	0.524	0.688	0.765
λ	0.95	1.11	1.24	1.47	1.85
λ'	0.95	1.07	1.18	1.38	1.72

It would thus be seen, he said, that for all cases which might occur in flange design, the results of the approximate theory were practically identical with the results obtained from the circular-plate theory.

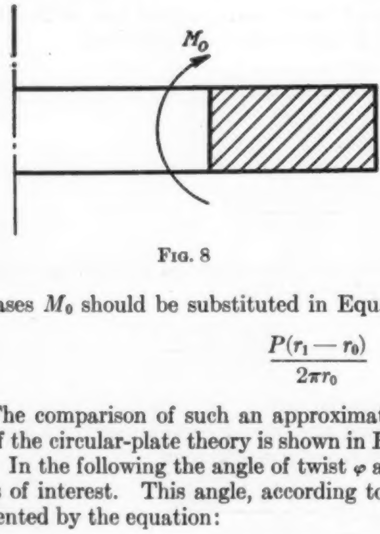

FIG. 8

It was interesting, he said, to note that the above approximate theory could be used also in the case when a narrow ring was twisted by couples uniformly distributed along the inner edge (Fig. 8). In such cases M_0 should be substituted in Equations [6] and [7] instead of

$$\frac{P(r_1 - r_0)}{2\pi r_0}$$

The comparison of such an approximate solution with the results of the circular-plate theory is shown in Fig. 7.

In the following the angle of twist φ at the inner edge of the ring is of interest. This angle, according to the writer, may be represented by the equation:

$$\varphi = \epsilon \frac{P r_1}{E t^3} \quad \text{[5a]}$$

The values of the constant ϵ for various values of α calculated by using the approximate Equation [5] and also from the circular-plate theory for the load conditions of Figs. 5 and 8 are given by the curves I, II, and III, respectively. It was pointed out that for small values of α there was no great difference in ϵ between these three cases, and that this fact could be used in approximate calculations of flanges. This is shown later by the writer. The numerical values of ϵ are given also in Table 2.

[8] Poisson's ratio was taken equal to 0.3 in this calculation.

TABLE 2

α	1	1.25	1.5	2	3
ϵ_1 (Curve I)	1.910	1.712	1.571	1.378	1.378
ϵ_2 (Curve II)	1.910	1.766	1.654	1.654	1.481
ϵ_3 (Curve III)	1.910	1.855	1.846	1.846	1.878

STRESSES AND DEFLECTIONS OF HUBBED FLANGES.

The writer called attention to the fact that in calculating stresses and deflections in hubbed flanges Mr. Waters had combined the theory of bending of circular plates with that of bending of tubes; in this manner arriving at the very complicated Equations [4] and [5] of his paper. The derivation of such equations and their form, he said, could be considerably simplified by using the approximate method developed above. In this manner a solution satisfactory for practical purposes would be obtained.

Considering first the case when the height of the hub was very great, Fig. 9 (a), he showed that under the action of the load P the flange would rotate as shown in Fig. 9 (b), φ being the angle of rotation. The stresses acting between the flange and the tube could

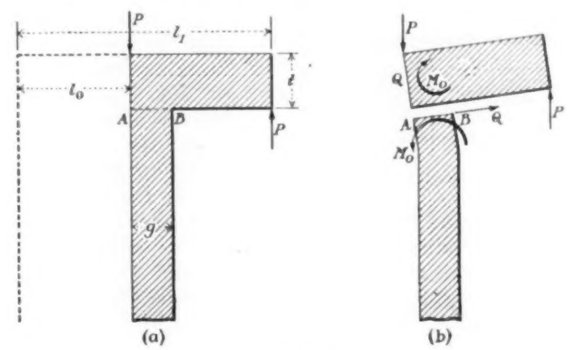

FIG. 9

be reduced to a couple M_0 and to a shearing force Q per unit length of the inner circumference. Considering the flange as a flat ring the twisting couple per unit length of inner edge would be

$$\frac{P(r_1 - r_0)}{2\pi r_0} - M_0 - Q\frac{t}{2} \quad \text{[8]}$$

Substituting this, instead of $\frac{P(r_1 - r_0)}{2\pi r_0}$ in Equation [4] one would obtain

$$\varphi = \frac{12\, r_0}{E t^3 \log_e \alpha}\left(\frac{P(r_1 - r_0)}{2\pi r_0} - M_0 - \frac{Qt}{2}\right) \quad \text{[9]}$$

The same angle will be obtained then from a consideration of the bending of the tube. Neglecting expansion of the tube at the flange[9] one would obtain[10]

$$Q = \beta M_0; \quad \varphi = \frac{6\, M_0}{\beta E g^2} \quad \text{[10]}$$

where

$$\beta = \frac{1.285}{\sqrt{gr}}$$

in which

g = thickness of the hub
r = middle radius of the tube.

Equating [9] and [10], the following equation for calculating M_0 would be obtained:

$$M_0 = \frac{P}{2\pi}(\alpha - 1)\frac{1}{1 + \frac{\beta t}{2} + \frac{1}{2}\left(\frac{t}{g}\right)^3 \frac{\log_e \alpha}{\beta r_0}} \quad \text{[11]}$$

[9] The center line of the flange will be somewhat compressed by the forces Q (Fig. 9(b)), but at joint AB between the hub and the flange some circumferential expansion exists, due to the twisting of the flange. Zero expansion will take place in some intermediate section between the middle plane OO and the plane AB. In the following it is assumed that the plane of zero expansion corresponds to AB. More refined calculations show that the assumption made is accurate enough. (The error for the numerical example discussed below according to the writer, is only about 2 per cent.)

[10] See Applied Elasticity, by S. Timoshenko and J. M. Lessells, Eqs. [107] and [108], p. 140.

This equation, he explained, could be applied also for hubbed flanges if only the height h of the hub was such that $\beta h \gtreqless 2$. Taking, for instance, the dimensions $r_1 = 6^1/_4$ in., $r_0 = 3^5/_{16}$ in., $t = 1^7/_{16}$ in., $g = {}^{13}/_{16}$ in., $h = 2^{11}/_{16}$ in., $r = 3^{23}/_{32}$ in., the result would be

$$\beta = \frac{1.285}{\sqrt{gr}} = 0.740 \text{ in.}^{-1}; \quad \log_e \alpha = \log_e \frac{6^1/_4}{3^5/_{16}} = 0.635; \quad \frac{\beta t}{2} = 0.530$$

Substituting in [11] one would obtain

$$M_0 = \frac{1}{1 + 0.530 + 0.717} \frac{P(r_1 - r_0)}{2\pi r_0} = 0.445 \frac{P(r_1 - r_0)}{2\pi r_0}$$

$$\frac{Qt}{2} = \beta M_0 \frac{t}{2} = 0.236 \frac{P(r_1 - r_0)}{2\pi r_0}$$

The twisting moment per unit length of the inner edge of the flange would be, from Equation [8],

$$0.319 \frac{P(r_1 - r_0)}{2\pi r_0}$$

and it could be concluded at once that, due to the reënforcement by the hub, the deflection and the stresses in the flange were reduced to 0.319 of what would be obtained for a flat-ring flange of the same proportions.

The maximum stress in the case under consideration, he pointed out, was that produced by the bending moment M_0 at the joint AB (Fig. 9) and would be obtained from the equation

$$p_h = \frac{6\,M_0}{g^2} \quad \ldots\ldots\ldots\ldots [12]$$

The most severe conditions would take place at points A and B (see Fig. 9(a)). At the first of these points the compressive stress given by Equation [12] should be combined with the circumferential tensile stress in the flange, high shearing stresses being thus obtained. At point B some stress concentration due to the reëntrant corner should take place.

If the height of the hub was not great enough and h was less than 2, Equation [10] should be replaced by the following equations:

$$Q = m\beta M_0 \text{ and } \varphi = n \frac{6\,M_0}{\beta E g^3} \quad \ldots\ldots\ldots [13]$$

in which m and n are constants depending on the magnitude of βh and which may be calculated by using the theory of bending of cylindrical tubes.[11] Several values of these constants are given in Table 3.

TABLE 3

h	=	0.5	0.8	1.0	1.2	1.4	1.6	1.8	2.0
m	=	3.00	1.89	1.54	1.32	1.17	1.09	1.04	1
n	=	12.2	3.30	1.97	1.43	1.19	1.09	1.04	1.02

If Equation [13] were used instead of [10] it was shown that the following equation for calculating M_0 would be obtained:

$$M_0 = \frac{P(r_1 - r_0)}{2\pi r_0} \cdot \frac{1}{1 + m\dfrac{\beta t}{2} + \dfrac{n}{2}\left(\dfrac{t}{g}\right)^3 \dfrac{\log_e \alpha}{\beta r_0}} \quad \ldots\ldots [14]$$

Taking, for instance, in the previous numerical example, $h = 2$ in., one would obtain $\beta h = 1.48$, and from Table 3, by interpolation, $m = 1.10$; $n = 1.11$. Substituting in Equation [14] would give

$$M_0 = \frac{P(r_1 - r_0)}{2\pi r_0} \cdot \frac{1}{1 + 1.10 \times 0.530 + 1.11 \times 0.717}$$

$$= 0.422 \frac{P(r_1 - r_0)}{2\pi r_0}$$

$$\frac{Qt}{2} = m\,\beta M_0 \frac{t}{2} = 0.246 \frac{P(r_1 - r_0)}{2\pi r_0}$$

The twisting moment from Equation [8] is

$$0.332 \frac{P(r_1 - r_0)}{2\pi r_0}$$

As compared with previous calculations for a very high hub, a diminishing in M_0 of about 5 per cent and an increase in twisting moment of about 4 per cent would result. Therefore, the writer maintained, one might conclude that an increase in the height of the hub above $h = 1.5/\beta = 1.17 \sqrt{r_0 g}$ added practically nothing to the strength of the flange.

Although in the previous discussion the approximate Equation [9] for the angle φ was used, it was explained that the results of the more exact plate theory given in Table 2 could also be used without difficulty in the solution of the problem. The load P would produce rotation of the inner edge of the flange equal to

$$\varphi_1 = \epsilon_2 \frac{Pr_1}{Et^3}$$

The moment at the inner edge,

$$M_0 + \frac{Qt}{2} = M_0\left(1 + \frac{\beta t}{2}\right)$$

would produce rotation of the inner circumference of the flange in the opposite direction equal to

$$\varphi_2 = \epsilon_3 \frac{P_1 r_1}{Et^3}$$

in which P_1 would be determined by the equation

$$M_0\left(1 + \frac{\beta t}{2}\right) = \frac{P_1(r_1 - r_0)}{2\pi r_0} \quad \ldots\ldots\ldots\ldots [15]$$

Finally, instead of Equation [9], one would obtain

$$\varphi = \varphi_1 - \varphi_2 = \frac{r_1}{Et^3}(P\epsilon_2 - P_1\epsilon_3) \quad \ldots\ldots\ldots [16]$$

This angle, he explained, should be equated to the angle given by Equation [10], giving

$$\frac{6\,M_0}{\beta E g^3} = \frac{r_1}{Et^3}(P\epsilon_2 - P_1\epsilon_3)$$

or

$$\frac{3}{\pi\beta} \frac{P_1(\alpha - 1)}{\left(1 + \dfrac{\beta t}{2}\right)} = \left(\frac{g}{t}\right)^3 r_1(P\epsilon_2 - P_1\epsilon_3) \quad \ldots\ldots\ldots [17]$$

from which P_1 easily could be calculated.

Calculating now M_0 from [15], and substituting this value in [17]

$$M_0 = P \frac{\epsilon_2}{\pi \dfrac{2 + \beta t}{\alpha - 1}\epsilon_3 + \dfrac{6t^3}{\beta g^3 t r_1}} \quad \ldots\ldots\ldots\ldots [18]$$

The value of M_0 for the numerical example considered above, computed by the more exact Equation [18], differed by only 14 per cent from that computed by the approximate Equation [11].

From this, the writer concluded, it would be seen that the approximate solution gave a very simple method for calculating stresses and deflections in hubbed flanges and hence might be useful for the determination of the proper proportions of such structures. Further refinements in analysis, such as the effect of radial normal stresses and of shearing stresses, might easily be added, but he considered them hardly necessary in an analysis of such rough structures as pipe flanges.

Further written discussion was contributed by J. P. DenHartog[12] in which the writer referred to the statement by the authors that two of the methods of approximate calculation seemed to give nearly the same numerical results, although they approached the solution from totally different angles. It could be shown, he said, that these two methods (i.e., the Crocker-Sanford and the "Locomotive" method) were the same.

He explained that if there were many bolts, the load W (due to *all* the bolts) could be assumed to be uniformly distributed along

[11] See Applied Elasticity, mentioned above, p. 143, and the tables calculated by P. Pasternak, *Beton u. Eisen*, vol. 25, Sept., 1926.

[12] Research Department, Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa.

the circumference. Taking a section α as in Fig. 10, the equal loads $\alpha/2\pi\ W$ and $\alpha/2\pi\ W'$ would form a couple:

$$m = \frac{\alpha}{2\pi} Wd \qquad [19]$$

indicated by the dotted arrow in the figure.

This moment, he explained, was kept in equilibrium by bending moments M on the faces of the section, and it followed immediately from Fig. 10 that for small angles α

$$m = \frac{m}{\alpha} = \frac{Wd}{2\pi} \qquad [20]$$

the bending moment derived by the "Locomotive" method.

Crocker and Sanford's half ring, according to the writer, could be considered to be built up of elements as shown in Fig. 10.

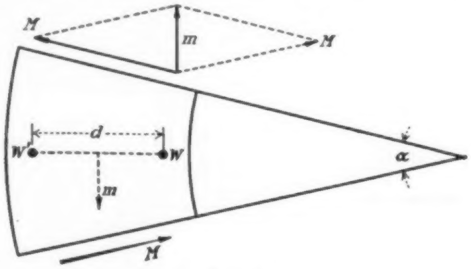

Fig. 10

The moments m of all elements had to be added vectorially, and would be chords of a half circle (Fig. 11). The total moment of the forces W thus would become

$$\left(\frac{\pi}{\alpha} m\right) \cdot \frac{2}{\pi}$$

represented by the diameter of Fig. 11. Substituting the value [19] in this one would obtain:

$$\frac{Wd}{\pi}$$

This would be the moment of the external forces on Crocker and Sanford's half ring and would have to be kept in equilibrium by *two* bending moments M on the two faces A and A' (Fig. 11). Thus

$$M = \frac{Wd}{2\pi}$$

identical with the result [20].

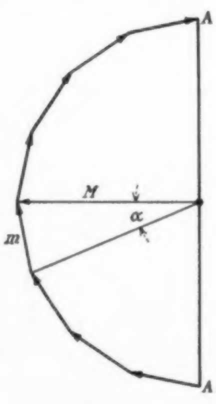

Fig. 11

Taking the example given in the paper, he showed that the moment m was calculated to 15,400 in-lb. ("Locomotive" method). The angle $\alpha = 2\pi/20$. The moment M then became $M = m = 10 \times 15{,}400 = 49{,}000$ in-lb. By means of the Crocker and Sanford method the authors found $2M = 97{,}100$ or $M = 48{,}550$ in-lb.

In the oral discussion which followed, A. L. Kimball,[13] commenting on the soundness of the theory, said that although the plate considered took the form of a ring and was not excessively thin when compared with its breadth, the test results showed that the theory of elasticity was sound in this case also. He did not agree with Mr. Wood's comments, regarding the desirability of taking account of the material.

F. Hodgkinson[14] thought that the paper was a greater contribution, but feared that the mathematics would not be likely to hold when flanges were tightened as they were in some plants.

Referring to a late practice, which had come into quite general use, he mentioned the tightening of flange bolts on 2-in. piping with absolute certainty and precision by merely measuring the stress. There could be no uncertainty, he pointed out, and absolute precision could be secured, which combined with mathematics must give the correct results.

George Orrok[15] stated that it had always appeared to him that the design of a pipe flange was somewhat similar to the design of a steel foundation for a turbine. One was not so much interested in the strength of the pipe flange, but its deflection was most important—it must not deflect beyond a pre-determined limit; therefore, one would be interested in the modulus of elasticity of the material.

At the temperature of use, the pipe flange must be made thick enough so that it will maintain its shape within a very minor deflection; then, in tightening the bolts it would be possible to measure the deflection of the bolt and know exactly the stress that existed between the flanges.

The speaker considered the formulas of Messrs. Waters and Taylor of assistance, but only in the low portion of the field. He recommended that there be developed from these formulas a deflection formula, which would permit prediction of possible deflection and knowledge of when to stop in strength calculations.

Authors' Closure

The authors are not a little surprised, and naturally much gratified, that their paper called forth such a wealth of discussion, and that the criticism of their efforts has been of so constructive a nature. With Mr. Crocker's able exposition of the Rankine theory as applied to pipe flanges, those who are interested can easily make their own comparisons with the more refined method of St. Venant, and Mr. Timoshenko's ingenious simplification gives a third means of attacking the pipe-flange problem, with surprisingly accurate results.

It was to be expected that critics of the paper would take the position that the authors' solutions are too refined for the class of engineering design for which they are intended. This objection might hold if the authors had gone about their work with the intention of applying it to a limited field, such as power-plant engineering. However, their purpose has been to develop a method that would stand the test of time, without having to be revised to keep pace with greater refinements in design, and which could be used with equal accuracy for high-and-low-hub flanges, large and small rings, flanges welding necks and flanged fittings—for power-plant work, hydraulic work, oil-refining work or any other branch of engineering in which the hubbed or flat flange finds application.

Moreover, there are obvious cases where the Rankine analysis, applied either by the Crocker-Sanford or the Tanner method, gives untrustworthy results. For example, suppose that the 14-in. Van Stone flange (p. 532) is given an overall hub height twice as great, or $fg = 10^3/_4$ in. Then the maximum stress by the former method reduces to 3280 lb. per sq. in., while by the latter method it remains unchanged. But common sense tells us that this new flange is very slightly stronger than the old one, and the St. Venant analysis bears this out.

Referring to the fifth paragraph of Mr. Crocker's discussion, the authors feel that he missed the point of their comparative solutions for the 14-in. Van Stone flange. It was not to be supposed that these three methods there illustrated would give identical results; rather, the purpose had been to show that the maximum stress as given by the Tanner method would differ from that given by the Crocker-Sanford method, and that therefore (1) neither method when used alone gave the full story as to maximum stress; (2) there should be another formula *or set of interrelated formulas* which would give both the maximum principal stresses at one calculation.

With regard to Equations [1] and [3] in the paper, it is true that they are slightly different when applied to flat rings, due to the difference between r_0 for rings and r_0 for hubbed flanges (cf. Figs. 3 and 20 in the paper), and the fact that $h = t/2$, and not zero, when the hub is reduced to zero. This was the result of an attempt to simplify the mathematical analysis, dimensions of the hubbed flange having been taken to the median line of the hub and median line of the flange, which is permissible when t and g are small in comparison with $r_1 - r_0$ and h_1. Actually, the difference is very

[13] Research Engineer, General Electric Co., Schenectady, N. Y.

[14] Consulting Mechanical Engineer, Westinghouse Electric and Manufacturing Co., Philadelphia, Pa.

[15] Consulting Engineer, New York, N. Y.

slight, as may be seen by inspection of the following values of p_t, which were figured for the above-mentioned 14-in. Van Stone flange, starting in with the given hub height and cutting off the hub in four equal decrements until a flat ring is produced.

p_t (Equation [3]), lb. per sq. in.	6027	6334	7509	12409	20500
p_t (Equation [1]), lb. per sq. in.	..	..	..	...	19610

Mr. Crocker's two numerical corrections in the authors' text—0.117 instead of 0.177 in Equation [3], and [1] instead of [2] in the second line of the last paragraph on page 538—are duly acknowledged, with regret that they should have been necessary.

Replying to Mr. Tanner's discussion, the authors appreciate the fact that, for the size of flanges that he tested, and the limited range that was being considered, the hoop stress was adequately taken care of by means of a constant, as he stated. However, it was their desire to present a formula that would have a more nearly universal field of application, and for this reason they have maintained the position that a strict analysis of the problem should take account of both the maximum radial and the maximum hoop stresses, and the possibility of their being not constant in their relation to each other, when there is a considerable variation in the shape and cross-section of the flanges under consideration.

This is especially true in the field of large-diameter rings and flanges for impregnating tanks and high-pressure containers where the proportions are quite different from those ordinarily used for high-pressure piping.

In criticising the specimen design problem that the authors worked out, in which the gasket pressure was assumed equal to the total steam pressure, Mr. Morehead has raised a very important question. The authors are willing to concede that, in many cases of actual design, this assumption of equality would be inaccurate. Nevertheless, they feel justified in maintaining that the determination of the true gasket pressure is a problem in itself, quite outside of the field which has been covered in this paper. When this pressure has been satisfactorily determined, their formula should give the true conditions of stress in a flange corresponding to any given amount of loading, with greater accuracy than would be attained by the methods that are now in use.

Coupled with this problem is the other one mentioned by Mr. Crocker in his discussion, of the actual location of the bolt forces and the center of application of the gasket reaction. This also is an engineering problem outside the scope of the present paper, but no matter what the true condition of loading may be, the proposed formula would inevitably give a truer picture of the actual stress condition than could be obtained by any combination of methods using the Rankine criterion.

Perhaps the necessity for such a degree of refinement may be questioned at the present time, but, as research and experience give a better knowledge of loading conditions and gasket pressures, it will be valuable in an increasingly larger number of cases.

In line with Mr. Timoshenko's simplification of the flange problem, the authors wish to state that the general theory which they used in their development is likewise capable of simplification, in the following steps (see page 533):

Assuming that dy/dr is constant (non-distortion of cross-section when deflected),

$$\frac{d^2y}{dr^2} = \frac{d^3y}{dr^3} = 0$$

$$p_t = -\frac{m^2El}{(m^2-1)r}\frac{dy}{dr}; \qquad p_r = -\frac{mEl}{(m^2-1)r}\frac{dy}{dr}$$

$$ds = -\frac{m^2El}{(m^2-1)r^2}\frac{dy}{dr}dl; \qquad s = -\frac{m^2E}{8(m^2-1)r^2}\frac{dy}{dr}(4l^2-t^2)$$

Assume that $P = \int_{-t/2}^{t/2} 2\pi \dfrac{r^2}{(r_1+r_0)/2} s dl$; then

$$\frac{dy}{dr} = \frac{3(m^2-1)(K_1+1)r_1P}{\pi m^2K_1Et^3}$$

$$y_i = \frac{3(m^2-1)(K_1^2-1)r_1^2P}{\pi m^2K_1^2Et^3} = \gamma''\frac{r_1^2P}{Et^3}$$

$$P_{t0} = -\frac{3(K_1+1)P}{2\pi t^2} = \lambda''\frac{P}{t^2}$$

Coefficients γ'' and λ'', as may be seen, compare very favorably with those in Table 1, and the formulas possess the added advantage of having no logarithmic factor, so that a table of coefficients is quite superfluous.

α ($m = 3^1/_3$)	1	1.25	1.5	2	3
γ''	0	0.313	0.483	0.652	0.772
λ''	0.955	1.074	1.194	1.432	1.910

Coming to Mr. Timoshenko's formulas for hubbed flanges, it is to be doubted whether these are much easier to handle than the authors' equations. Furthermore, his Table 2 indicates considerable discrepancy between the angle of twist at the inner edge of the flange, as given by his approximate method and as given by the strict theory of circular plates with a moment acting along the inner edge, when the ratio of outside and inside radii of the flange is greater than 1.25. In other words, the assumption of non-distortion of section, so nearly true for flat rings, does not hold for hubbed flanges of all proportions.

As a matter of interest, the formulas [1] and [3] have now been charted[16] so that it is possible to get highly accurate results without any calculation at all. An added feature of the chart for Equation [3] is a group of curves which show at a glance the greatest useful height for the hub of a flange of given radius r_0 and thickness g.

The authors are under obligation to Mr. Den Hartog for proving the essential identity of the Crocker-Sanford and "Locomotive" methods. The reason for the slight difference in their results as given on p. 532 is due to their use of the actual center of gravity of the gasket area in the one case, and the center of gravity of the median semicircle of the gasket area in the other.

Replying to Mr. Orrok's request for a deflection formula, attention is called to Equations [2] and [5] of their paper, by which the maximum deflection of flat rings and hubbed flanges, respectively, may be calculated. Other formulas may be deduced for the deflection of the hub, using the relations given in the appendix, but this is thought to be of minor importance.

Field of Arc Welding Grows

NOISLESS building erection is just one of the many advantages that will be effected in coming years by arc welding, which is being adapted to the erection not only of structural steel buildings but also of bridges and even private homes. It is a factor that is being seriously considered by civic officials. Recently an investigation into the resultant noise effects of building erection was conducted and it was found that the efficiency of office workers in nearby buildings was reduced nearly 50 per cent; business was partly paralyzed, and even hotel patronage considerably reduced during lengthy operations.

The engineers who have developed structural arc welding during the past few years, however, did so with the idea of overcoming certain existing handicaps in structural-steel assembly. It was found that about 10 to 15 per cent less steel was required for building operations by the arc-welded process than by riveting. It was also found that arc-welded beams were nearly 50 per cent stronger than similar riveted beams for the same weight.

The perfecting of arc-welding machinery and particularly the automatic welder has made it adaptable to all manner of operations. It is being incorporated in machine tools, one of the latest developments being a machine for making steel wheels.

Welding is also being applied to all manner of shop operations. It has even been adapted to airplane construction, by modern concerns utilizing a steel-tube welded fuselage and wing structure. Welding is even being applied to machine-tool manufacture, welded-steel frames supplanting the cast-iron frames in much of the modern equipment.

Future homes will probably be welded, permitting the use of steel framework for house construction, thus making possible fireproof dwellings at a moderate cost.

[16] Copies of these charts may be obtained on request from the American Spiral Pipe Works, Chicago, Ill.

SURVEY OF ENGINEERING PROGRESS

A Review of Attainment in Mechanical Engineering and Related Fields

A New Cross-Section for the Draft Tubes of Turbines and Pumps

IN APPLYING the hydrodynamics of steady flow to the determination of theoretical bases for the design of draft tubes and rotors, it is usual to simplify the mathematical treatment of the problem of flow by assuming freedom from turbulence. Under this assumption the individual velocity components c_z, c_r, and c_u of the absolute velocity in a system of cylindrical coördinates are considered as partial derivatives

$$c_z = \frac{\partial \Phi}{\partial z} \quad c_r = \frac{\partial \Phi}{\partial r} \quad c_u = \frac{\partial \Phi}{r \partial \varphi} \ldots\ldots\ldots\ldots [1]$$

of a function of coördinates, which is then called the velocity potential. It is, however, entirely possible to obtain a good practical solution of the more general case, namely, that of a simple flow of liquid subject to turbulence. This is the purpose of the present paper.

The study of meridional steady flow in the transition space leads to a general differential equation of the second degree, namely,

$$\frac{\partial^2 \Psi}{\partial z^2} + \frac{\partial^2 \Psi}{\partial r^2} - \frac{1}{r}\frac{\partial \Psi}{\partial r} = 2r^2(A\Psi + B) \ldots\ldots\ldots [2]$$

where A and B are constants and $\Psi = f\,(r, z)$ represents the function of lines of flow, or, expressed otherwise, it represents the parametric equation of the curves of intersection between the meridian plane and a surface of rotation containing the paths of the flow. If it be assumed that there is such a velocity potential by which the relations [1] are satisfied, the constants will be equal to zero. Equation [2] is then correspondingly simplified and for Ψ is obtained the well-known equation of potential shapes

$$\frac{\partial^2 \Psi}{\partial z^2} + \frac{\partial^2 \Psi}{\partial r^2} - \frac{1}{r} - \frac{\partial \Psi}{\partial r} = 0 \ldots\ldots\ldots\ldots [3]$$

from which are derived the hyperbolic sections of Prášil and Lorenz for draft tubes and turbine wheels. The hypothesis of the existence of a velocity potential then changes the fundamental equation, and hence also its common integral which is supposed to express the aggregation of the Ψ-functions desired as well as define the shape of the walls determined by these functions.

On the other hand, it can be shown that in a rigid tube of a kind determined by Equations [2] and [3], and no matter whether turbulent flow or flow free from turbulence be maintained, it is also possible to have a gyrating motion without change of the streamline surfaces; this is possible as long as the product $c_u r$ (peripheral component of the absolute velocity of any element by its distance from the axis of rotation) is constant in the entire space.

This observation makes it possible to connect Equation [2] with the turbine theory, because the above condition which is here assumed to be practically satisfied at the entrance and hence within the entire region of the draft pipe is also expressed in exactly the same way in the equation of moments of a turbine, namely,

$$M = \frac{\gamma Q}{g}\,(r_1 c_{u1} - r_2 c_{u2})$$

That is to say, both within the entire entrance opening as well as all over the outlet opening of the turbine wheel, the products of the expression within the parentheses (the difference of which determines the magnitude of the moment) have the above constant values.

Equation [2] can therefore be made a foundation for the derivation of exact theoretical sections for straight-line draft tubes. It now becomes possible to give without much trouble some of its particular integrals which are of such a character as to impart the characteristic of periodicity to most of the functions. The investigation is restricted to a single case, namely, the particular integral

$$\Psi = Cz \sin\left(\sqrt{-\frac{A}{2}}\, r^2\right) - \frac{B}{A} \ldots\ldots\ldots\ldots [4]$$

which, as can be easily shown, gives a solution of Equation [2] by two steps, the first of which is the building up of the partial-differential quotients

$$\frac{\partial^2 \Psi}{\partial z^2}, \quad \frac{\partial^2 \Psi}{\partial r^2}, \quad \frac{\partial \Psi}{\partial r}$$

and the second step is their insertion in Equation [2] as above. This function gives for each arbitrarily selected value of the parameter Ψ a v-curve symmetrical with respect to the z-axis and located in the meridian plane (Fig. 1). This v-curve runs alternately above and below the r-axis in damped periods in both directions and extends to infinity. Besides its streamline form, this curve possesses the following interesting properties.

The axial and radial velocity in the case of a frictionless, incompressible liquid is found as a function of Ψ from the following equations:

$$\left.\begin{aligned} c_z &= \frac{1}{\gamma r}\frac{\partial \Psi}{\partial r} = 2\frac{C\sqrt{-\frac{A}{2}}}{\gamma}\, z \cos\left(\sqrt{-\frac{A}{2}}\, r^2\right) \\ c_r &= \frac{1}{\gamma r}\frac{\partial \Psi}{\partial z} = -\frac{C}{\gamma r} \sin\left(\sqrt{-\frac{A}{2}}\, r^2\right) \end{aligned}\right\} \ldots [5]$$

From this it appears that when z and r have the same signs, c_z and c_r have contrary signs. If z and r are positive and C be so selected as to be negative, the flow is directed downward with a progressive decrease of velocity. This is the case of flow through the draft tube of a turbine. If C be so selected as to be positive the flow will be oppositely directed and will be affected by progressive increase in velocity which will give it the flow characteristic of that through a pump draft tube. In the first period when

$$r = 0 \text{ to } r = \sqrt{\frac{\pi}{2\sqrt{-\frac{A}{2}}}}$$

It appears that

$$c_z = 0 \text{ when } z = 0 \text{ and } r = \sqrt{\frac{\pi}{2\sqrt{-\frac{A}{2}}}}$$

which, in other words, means that along a circular cylinder of radius

$$r = \sqrt{\frac{\pi}{2\sqrt{-\frac{A}{2}}}}$$

(Fig. 1) the direction of absolute velocity is horizontal and its constant value is equal to

$$c = c_r = -C\sqrt{\frac{2\sqrt{-\frac{A}{2}}}{\pi}}$$

The Ψ-curves have at these points their minimum value. Assuming a ring of radius r and elementary width dr, it will be found that

within a unit time the amount of flow through this ring in the axial direction is

$$dQ_z = 2\pi r dr c_z = \frac{2\pi}{\gamma} - \frac{\partial \Psi}{\partial r} dr$$

If this equation be integrated over an entire circular disk of radius r at constant z there will be obtained a quantity of liquid flowing within the surface of rotation Ψ, namely,

$$Q = \frac{2\pi}{\gamma} \Psi \ldots\ldots\ldots\ldots\ldots\ldots\ldots [6]$$

If now, assuming a special case, there be substituted for Ψ its

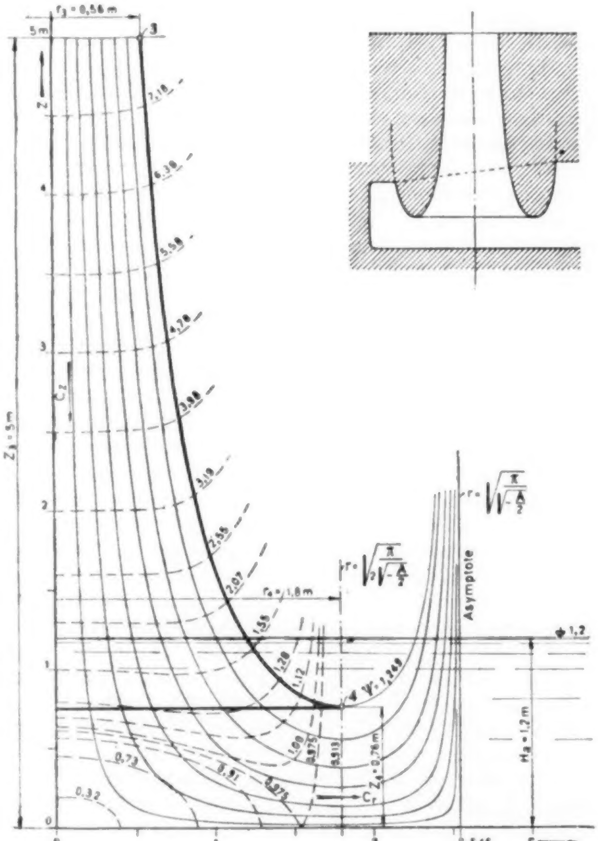

FIG. 1 MERIDIAN AND ISOTACHIAL CURVES FOR DRAFT TUBES OF HYDRAULIC TURBINES AND PUMPS

FIG. 2 (UPPER RIGHT-HAND CORNER) CROSS-SECTION OF CONCRETE DRAFT TUBE DESIGNED IN ACCORDANCE WITH FIG. 1 AND APPROXIMATING THE SHAPE OF A MOODY TUBE

value given by Equation [4], and if it be further taken into consideration that if $z = r = 0$, then $Q = 0$ and hence $\frac{B}{A}$ becomes likewise 0, one obtains instead of Equation [6] the relation

$$\Psi = \frac{\gamma Q}{2\pi} = Cz \sin\left(\sqrt{-\frac{A}{2}}\, r^2\right) \ldots\ldots\ldots\ldots [7]$$

which is nothing else but the equation of the desired surface of rotation. It contains two arbitrary constants, however, which have to be determined by the limiting conditions.

A draft tube so constructed as to have the lines of flow in accordance with Equation [7], is determined when two points on its meridian curve are known. The diameter D_3 and the distance z_3 of the entrance surface from the level of the tail-water passage are always given, and this provides the first limiting condition for determining the constants. As the second condition may be taken, at least theoretically, the extension of the tube down to the minimum point on the flow curve, whereby (Fig. 1) the coördinates of the outlet rim are found to be equal to

$$z_4 \text{ and } r_4 = \sqrt{\frac{\pi}{2\sqrt{-\frac{A}{2}}}}$$

By successively substituting this value in Equation [7] the following two equations are found:

$$\Psi = \frac{\gamma Q_1}{2\pi} = Cz_3 \sin\left(\sqrt{-\frac{A}{2}}\, r_3^2\right)$$

$$\Psi = \frac{\gamma Q}{2\pi} = Cz_4 \sin\left(\sqrt{-\frac{A}{2}}\, r_4^2\right)$$

These may be modified by making the following substitution:

$$\sqrt{-\frac{A}{2}} = \frac{\pi}{2\, r_4^2} \ldots\ldots\ldots\ldots\ldots\ldots [8]$$

as a result of which the following is found for z_4:

$$z_4 = z_3 \sin \frac{\pi}{2} \left(\frac{r_3}{r_4}\right)^2 \ldots\ldots\ldots\ldots\ldots\ldots [9]$$

Since Q is known, it follows that when, for example, the radius r_4 of the outlet rim has been selected, then z_4 and both constants C and A are simultaneously determined by the above relations, and furthermore the meridional exit velocity is also determined and acquires in accordance with Equation [5] at point 4 the value

$$c_{r4} = -\frac{C}{\gamma r_4} \ldots\ldots\ldots\ldots\ldots\ldots [10]$$

which is of such great importance for the designer. If it should happen that the values so found for z_4 and for c_{r4} are not suitable for the conditions existing in the discharge passage, another value for r_4 must be assumed and a new calculation made. However, the desired end can be reached very quickly by bearing in mind, as stated above, that c_r is constant when r is constant, and hence the following equation holds good for c_{r4} at point 4:

$$c_{r4} = \frac{Q}{2\pi\, r_4 z_4} \ldots\ldots\ldots\ldots\ldots\ldots [11]$$

which permits calculating the two constants by going from then on backward. These analytical considerations, made clearer by Fig. 1, are sufficient to make intelligible the calculation in the following example.

The problem is that of designing a turbine draft tube on the basis of a given function Ψ. The following data are given: $Q = 7.85$ cu. m. per sec., $z_3 = 5$ m., $D_3 = 1.12$ m., $r_3 = 0.56$ m., and the height of the tail-water level $H_a = 1.2$ m.

By substituting successively various values for the ratios at exit r_4 from Equations [9] and [11] the following values for z_4 and c_{r4} are obtained:

for $r_4 = 1.5$ m., $z_4 = 1.094$ m., and $c_{r4} = 0.762$ m. per sec.
for $r_4 = 1.6$ m., $z_4 = 0.962$ m., and $c_{r4} = 0.811$ m. per sec.
for $r_4 = 1.7$ m., $z_4 = 0.852$ m., and $c_{r4} = 0.862$ m. per sec.
for $r_4 = 1.8$ m., $z_4 = 0.760$ m., and $c_{r4} = 0.913$ m. per sec.

The last values are ultimately selected. It may be mentioned here that as large a value of z_4 as possible should be selected. From Equation [10] with $\gamma = 1$, the following value for C is obtained:

$$C = -\gamma r_4 c_{r4} = -1 \times 1.8 \times 0.913 = -1.644$$

and from Equation [8] is obtained

$$\sqrt{-\frac{A}{2}} = \frac{\pi}{2(1.8)^2} = 0.485$$

The parameter Ψ can be now calculated from Equation [6] by substituting in it a negative Q (the sign is determined by the direction of flow):

$$\Psi = \frac{\gamma Q}{2\pi} = \frac{1(-7.85)}{2\pi} = -1.249$$

Substituting the above values in Equation [7], the desired equation for the cross-section of the draft tube may be obtained:

$$z = \frac{0.760}{\sin\,(0.485\;r^2)}$$

which can then be plotted in accordance with Fig. 1. On the same figure crosswise to the lines of flow are plotted the isotachial or meridian curves of the surfaces of equal velocity distribution within the region of flow, this being done from a knowledge of corresponding values of absolute velocities. These isotachials are determined by inserting in the equation $c = \sqrt{c^2_z + c^2_r}$ the values for c_z and c_r from Equation [5]. For c = constant = K, the following equation for these curves (with parameter K) is obtained:

$$z = \sqrt{\frac{\dfrac{\gamma^2K^2}{C^2} - \dfrac{1}{r^2}\sin^2\left(\sqrt{-\dfrac{A}{2}}\;r^2\right)}{2A\left[\sin^2\left(\sqrt{-\dfrac{A}{2}}\;r^2\right) - 1\right]}}$$

If in accordance with the above function a cast-iron draft tube be made, it should be extended into the overflow passage only as deeply as necessary so as to save material. If, however, particular value is attached to having a perfect radial outflow, one may, in the case of larger draft heads, make the upper part conical and shape the lower adjoining part in accordance with the above function. This will give an adequate outflow diameter and will do away with phenomenon of cavitation at the walls. If, however, the draft tube is made of concrete it may be shaped in accordance with Fig. 2 like a Moody tube (see The Present Trend of Turbine Development, Trans. A.S.M.E., vol. 43, 1921, pp. 1113 et seq.). The only question left to consider deals with so-called turbulences which produce apparent losses in this tube. (Karl Grimm, Engr., Escher-Wyss & Co., Zurich, in *Schweizerische Bauzeitung*, vol. 90, no. 12, Sept. 17, 1927, pp. 149–151, *tA*)

Short Abstracts of the Month

AERONAUTICS (See Mechanics: Investigation of Torsional Vibration with Particular Reference to Aircraft Engines)

AIR ENGINEERING

Gas-Lift Pumping

THE present abstract deals with two papers on this subject presented before the American Institute of Mining and Metallurgical Engineers at the Fort Worth meeting, October, 1927. Other papers presented at the same meeting were noted in the November issue of MECHANICAL ENGINEERING, pp. 1194 and 1227.

H. C. Miller, of San Francisco, Cal., discussed the mechanical installations for gas-lift pumping as practiced in the California oil fields. He mentioned in particular such wells as the Miley Athen's No. 6, Rosecranz Field, in California, which it would not have been economical had it been mechanically possible to bring into production by any other method of pumping known today. At this well production is obtained from between 7305 and 7591 ft., and eleven months after completion of the well, production was being maintained on the gas lift at approximately 2000 barrels a month. The crookedness of the hole, its diameter, and depth do not prevent the successful application of gas-lift pump when other conditions are favorable.

Many operators use one or more gas-engine, electric-motor, or steam-driven compressor units for bringing in, testing, and pumping individual wells. These units are usually mounted on four-wheel trucks or on skids and can be readily and easily moved from well to well. Such portable equipment is generally for temporary use only. It is moved to another well as soon as a permanent installation is completed, or the well has been tied into the gas line from a central compressor plant. The compressors of portable units are usually either duplex, or straight-line tandem, two-stage machines. Low-pressure-gas-cylinder diameters range from 8 to 12 in. High-pressure-cylinder diameters range from 4 to 6 in. and the lengths of stroke from 8 to 12 in. The majority of portable and semi-permanent units in California use 8×4×8-in. compressors running at a speed of about 250 r.p.m. The sizes of gas engines and motors for portable units vary according to the power requirements of the compressors. Gas engines rated at 40 to 60 hp. and electric motors up to 100 hp. are generally used on portable compressor units. A few semi-permanent units are steam-driven, straight-line machines with 9-in. low-pressure and 4-in. high-pressure gas cylinders, 12-in. steam cylinders, and 10-in. stroke.

The Richfield steam-driven compressor plant of the Union Oil Co. of California consists of 19 Chicago Pneumatic single-stage direct-connected steam-driven compressors. Thirteen of these units are 10 × 10 × 10-in., five are 10 × 17 × 10-in., and one is a 10 × 6 × 10-in. compressor for starting or booster purposes; also used in conjunction with the five 7-in. machines when starting pressures are not required. Each compressor is driven by one 80-hp. Broderick return tubular boiler.

The wet gas from the wells at 10 in. vacuum is first compressed in a separate compressor plant to 30 lb. per sq. in. and circulated through an absorption plant where its gasoline is recovered. The intake gas to the 13 × 10 × 10-in. units in the steam-driven plant is taken from the absorption-plant discharge line at 20 lb. and compressed to 140 lb. per sq. in. The 7-in. and 6-in. compressors then take this gas at 130 lb. pressure and further compress it to a pressure of 325 lb. per sq. in. This plant delivers 8,000,000 cu. ft. of gas per day at 325 lb. pressure to an 8-in. distributing header equipped with Westcott recording meters and gate valves for controlling the volume of gas to each well. These meters are located at the header on the 3-in. individual lines to the wells. The booster compressor is connected to the distributing header in such a manner that high-pressure gas may be delivered to any one of the 19 or more wells.

The new Richfield gas-driven compressor plant consists of four 320-hp. and one 640-hp. Worthington direct-connected compressors. The 320-hp. machines have 16-in. intermediate and $9^1/_2$-in. high-pressure cylinders; the 640-hp. compressor has a 22-in. intermediate and a 13-in. high-pressure cylinder. The length of stroke on all machines is 20 in. The diameter of the gas-engine cylinders is $18^1/_2$ in. The 320-hp. compressors are each equipped with two, and the 640-hp. machine with four, of these $18^1/_2$ × 20-in. gas cylinders, each of which is four-cycle, double-acting.

As at the Richfield plant, the intake gas to the gas-driven plant is taken from the absorption-plant discharge at a pressure of 20 lb. per sq. in. The discharge from the intermediate cylinders enters the high-pressure cylinders at 80 lb. and is discharged at a pressure of 325 lb. per sq. in. The capacity of this plant is 12,000,000 cu. ft. of gas per day at 325 lb. pressure.

The proper control of the volume and pressure of the gas to individual wells on the gas lift is essential. For highest efficiency these factors should be maintained reasonably constant. At some wells hand control has proved satisfactory, and many operators in California are resorting to this method of maintaining proper pressure and volume of gas to the wells. At many large-scale installations of gas-lift flowing methods where the gas to the wells is distributed from a common header, the volume of gas to the individual wells is regulated manually at the header by opening and closing gate valves installed on the individual lines at the header.

Some operators, on the other hand, prefer and use automatic control devices because they believe that mechanical pressure- and volume-control devices are more reliable and effective, and that by their use more oil is produced at a lower cost per barrel. Several types of automatic gas-volume regulating devices are in use in the California oil fields. Two types are described in this paper, the Foxboro and the Natural Gas Equipment Co.'s controllers.

Preheating the compressed gas by steam in an ordinary type of heat interchanger before it enters a gas-lift well, has made it possible to flow some of the low-gravity California oils. In Cay Canyon, Santa Barbara County, 11.5 A.P.I. gravity oil, so viscous that it will not flow at ordinary temperatures, is being flowed successfully from a depth of about 2900 ft. by the use of heated

gas. The compressed gas at 475 lb. per sq. in. pressure is heated by steam to about 200 deg. fahr. in a preheater made out of a piece of 10-in. casing 4 ft. long. The gas passes through 38 tubes, 3 ft. long, which are welded in headers and enclosed in the preheater, and is delivered to the well where the temperature at the casinghead is maintained at 190 deg. fahr. The oil from the well has a temperature of 100 deg. fahr. at the casinghead.

Surprisingly small volumes of heated gas are required to flow this oil, the viscosity of which has been appreciably lowered by the heated gas. Two wells producing respectively 275 and 350 bbl. of oil daily are being flowed by 330,000 cu. ft. of heated gas a day at 500 lb. per sq. in. pressure. This volume of gas is being furnished by one compressor.

Some low-gravity oils in California have also been successfully flowed by preheated air. One well in particular, when flowing through 3-in. casing from a depth of 2000 ft., flowed 250 bbl. of 16 A.P.I. gravity oil a day with 340,000 cu. ft. of air at a temperature of 190 deg. fahr. When the temperature of the air was raised to 300 deg. fahr. and the tubing diameter increased to 4 in., production rose to 325 bbl. at an added consumption of only 60,000 cu. ft. of air per day. The normal working air pressure in both cases was 240 lb.

It is important that automatic recording gas meters and pressure gages be provided on the gas lines to the wells and on the gas discharge lines from the gas traps. Continuous records of both static and differential pressures of the gas to and from the wells, recorded on 24-hr. charts, is the means of gaging the performance of the gas lift. Without these records, operators work more or less in the dark, and inefficient operation usually results. The difference between the gas volume passing through the meter on the gas-discharge line and that passing to the well is the volume of gas coming from the oil sand and from solution in the oil. If there is no leakage of gas to low-pressure sands above the productive horizon in the well, then the ratio of this differential gas figure in cubic feet per day to the volume of oil in barrels produced is the formational gas factor, better known as the gas-oil ratio.

The subject of casinghead connections is discussed, and figures of cost of installing the gas-lift system are given, likewise operating costs. These figures are given in detail, but in spite of their interest cannot be reproduced in this abstract because of lack of space. (Technical Publication No. 37, Class G, Oil and Gas, No. 4, American Institute of Mining and Metallurgical Engineers, issued with *Mining and Metallurgy*, for Oct., 1927, 15 pp., *dp*)

E. V. Foran, production engineer of the Marland Oil Co. of Texas, described Mechanical Installations of the Gas Lift in Texas Other Than in the Gulf Coast Region. Nearly all the gas-lift wells in this area are from 2900 to 3200 ft. deep. The tubing sizes in the wells vary from $2^1/_2$ in. to a maximum of $4^1/_2$ in., depending upon the size of the well.

The required working input pressures to flow wells in the Panhandle varies from approximately 100 to 225 lb. per sq. in. Under these conditions the gross gas-oil ratio varies from 2200 to 3500 cu. ft. per bbl. of oil. The net gas-oil ratio from the sand varies from 200 to 600 cu. ft. per bbl. The starting pressures required on these wells vary from 250 to 500 lb. per sq. in. The power for compression used in the Panhandle area is both gas engines and electric motors. The gas is separated from the traps and passed through gasoline compression plants and then into the high-pressure stations. In some cases dry natural gas is compressed to the required pressures and transmitted to the lift wells. The rock pressures in the Panhandle lift wells vary from approximately 175 to 400 lb. per sq. in.

In the McCamey area, both the Marland and Roxana Companies have tried to overcome the difficulties encountered in handling the corrosive H_2S gases, but success has been limited and marked by frequent interruptions in the operations of the plants. The production in the McCamey area comes from lime at about 2100 to 2300 ft. The tubing used in these wells is $2^1/_2$ to 3 in. It is usually set 300 or 400 ft. off bottom and the input air pressure at the casinghead carries from 160 to 200 lb. Air is used as insufficient gas is available for this purpose. The corrosive action of the air and sulphur gases is so severe that tubing must be replaced in these wells every six weeks. This gas cannot be used for the engines as it will completely burn through the piston head in three or four months.

One of the outstanding features of the operations in this pool is the type of surface equipment used. All of the plants are equipped with compressors capable of delivering gas for starting pressures as high as 600 lb. and in some cases to 1000 lb. Volume-control meters are installed in nearly all cases where gas is being delivered from a high-pressure header to several wells which require different input pressures. Air is used to flow the wells as there is insufficient gas for this purpose. Not all of the gas-lift wells are equipped with meters to measure the wells' output gas, although there is a meter on each input well. This, of course, makes it impossible to say just what the net gas-oil ratio is.

In the Noodle Creek field in Jones County, the Marland Oil Co. has made a radical departure from conventional tubing sizes and arrangements as well as plant design and methods of gas recirculation. Due to the curtailment in drilling operations in March, 1927, only one well was put on gas-lift production. This was a 1400-bbl. well and was placed on the lift Feb. 4, 1927, 12 days after the wells were completed. The production in the pool is from a lime formation at 2510 ft. The initial rock pressure of this field was abnormally low, showing approximately 330 lb. per sq. in. In this case a conventional installation was made, but after the well was on the air lift three months the daily production fell off and the input pressure dropped to a great extent largely due to the rapid pressure depletion in the sand on account of this well being offset by three other producers.

At this point it was decided that a radical change in both the tubing arrangement and compressors would have to be made in order to obtain the desired lower input pressure.

The high-pressure cylinder of a two-stage tandem-driven compressor was replaced by a low-pressure cylinder and the volumetric capacity of the compressor was doubled. Both the $5^3/_{16}$- and $2^1/_2$-in. tubing were pulled and a mixed string consisting of 275 ft. of 3-in. tubing as the lower part, and 2226 ft. of $5^3/_{16}$-in. casing as the upper part of the tubing was run in the well. The total tubing length was 2501 ft. This placed the bottom of the tubing 8 ft. above the top of the sand.

The well was then put on production and the input air pressure required to flow it was only 60 lb. Six pounds back pressure was indicated on the casinghead. This low pressure against the face of the sand resulted in an increase in the effective drainage area of this well, which, in turn, resulted in a decline rate much slower than before the change was made.

Although the increased volume of input air on single-stage compression gave remarkable results in contrast to those observed before the tubing change was made, it also presented some disadvantages, the greatest of which was the reduction of the gravity of the oil from 39.5 deg. to 38 deg. A.P.I. due to increased gasoline losses which were escaping to the air as there was no gasoline plant available to recover the vapors which tested 1.2 gal. of gasoline per thousand feet. The daily popoff to the air was 950,000 cu. ft. This indicated a loss of 1140 gal. of gasoline daily.

It was then decided to recirculate the output air-gas mixture from the well and allow any condensate which might occur after the compression to return to the well instead of installing condensing coils following the compressor discharge. This process resulted in an immediate rise in the gravity of the oil from 38 to 41 deg. A.P.I. and an increase of 24 bbl. of oil per day, which represented the vapor losses in the air-gas mixture formerly escaping to the air. The gas was separated at the trap under a pressure of 7 lb. and delivered to the compressor intake at 5 lb. above atmosphere. This increased the compressor output 25 per cent above the free-air capacity and resulted in a lower input pressure on the well. It is therefore apparent that this practice may open new possibilities to gas-lift operations which will result in a higher overall efficiency of ultimate production. This can be attained through the installation of a tubing pattern of such sizes and arrangement that wells producing up to 1000 bbl. daily and at depths up to 3000 ft. may be flowed at pressures which will require only single-stage compression. (Paper before the American Institute of Mining and Metallurgical Engineers, Fort Worth Meeting, Oct., 1927. Abstracted from mimeographed preprint, 9 pp., *dp*)

ENGINEERING MATERIALS

Valve Steels

Valves in explosion motors have to satisfy certain conditions which are particularly strenuous in the case of exhaust valves. The metal must be of sufficient hardness when hot so as not to be distorted, as this would produce a poor "seat." It must not be brittle, as the valve is subject to shocks and vibrations. The metal must not oxidize easily at high temperature, as otherwise it will be unable to resist the action of exhaust gases sufficiently hot to raise the temperature of the valve head to 700, 800, or even 850 deg. cent. (1292, 1472, 1562 deg. fahr.).

The zone of transformation must be above any temperature attained in service, since steel heated through the critical point changes its characteristics and may become unsuitable for service. Further, the metal must be a good heat conductor, which is necessary to prevent excessive rise of temperature, while its density must be as low as possible in order to reduce inertia effects. A number of steels have been tried out. High-speed steels with a large content of chromium and tungsten are very hard at room temperature, and part of this hardness is retained at high temperatures; they are but little subject to oxidation, on the other hand, the resilience is very low, the zone of transformation also very low, and the density high. Stainless steels have a satisfactory corrosion resistance and a suitable location of the transformation point but lack in hardness. Austenitic steels with high content of nickel and chromium and appreciable additions of manganese and tungsten have the advantage that within the service limits of temperature they have no transformation point at all; they are highly resistant to heat and oxidation. Their physical properties are good but their hardness is low, and in addition the coefficient of expansion is greater than that of other steels.

High-carbon cobalt-chromium steels (carbon in excess of 1 per cent, chromium 12 to 14 per cent, cobalt 2 to 4 per cent, sometimes molybdenum) are very hard but their point of transformation lies around 800 deg. cent., and if they pass that they become brittle on cooling. Their resilience is also quite low. Silchrome steels (silicon-chromium-carbon) are extensively used today. Their hardness at room temperature is satisfactory, resistance to oxidation very good, and resilience high. The presence of silicon raises the point of transformation so that the working temperature is considerably below the annealing temperature, and the metal preserves in service all of its characteristics. The presence of silicon, however, reduces somewhat the hardness when hot. (H. Drouot, in *La Technique Moderne*, vol. 19, no. 19, Oct. 1, 1927, p. 603, *g*)

FUELS AND FIRING

Recent Developments in Pulverized-Coal Burning

The present article deals with experiments by the United States Shipping Board, Fuel Conservation Section, and the Fuel Testing Plant of the Philadelphia Navy Yard, and refers chiefly to burning pulverized coal in marine boilers.

Comparing the burning of pulverized coal of 14,400 B.t.u. to bunker oil of 18,300 B.t.u., it was found that about 5 per cent of the steam generated is required in the pulverizing and distribution process in the former case, while 2 per cent is required in the latter case for introducing the oil into the furnace. One pound of oil therefore has the comparative effectiveness of 1.36 lb. of coal. But the oil costs $11.60 a ton, while the cost of the coal is $6.00 a ton.

The application of pulverized coal on shipboard is somewhat complicated by the fact that the great majority of the ships afloat are fitted with Scotch marine boilers, each having three furnaces with separate combustion chambers. These furnaces, because of their low volume and short length, are unsuitable for the combustion of pulverized coal as usually fired in stationary practice. Because of this initial tests with streamline burners were not successful. In tests recently carried out the equipment consisted of Scotch marine boiler having 2550 sq. ft. heating surface, a Kennedy-VanSaun pulverizer, and a Peabody burner and distributer (not described in detail). In these tests as much as 2400 lb. of coal was burned per hour per boiler, this being equivalent to 6 lb. per cu. ft. of furnace volume. The results of these tests are now being calculated and may be used in a technical paper to be presented at the November meeting of the Society of Naval Architects and Marine Engineers. (*Power Plant Engineering*, vol. 31, no. 19, Oct. 1, 1927, pp. 1032–1033, *e*)

Light Oils from Utah Coals

A study of the composition of light oils obtained through the low-temperature carbonization of Utah coal has been conducted by chemists of the United States Bureau of Mines, Department of Commerce, and Carnegie Institute of Technology, Pittsburgh, Pa. This investigation was undertaken because of the need of information on the composition of low-temperature oils and tars in their evaluation by buyer and seller, by producer and user, and others. The investigation was one coördinated with a study of the use of superheated steam as an internal-heating medium in the production of smokeless fuel, and with a study of the gases produced during the carbonization and their variation with temperature. The coal used was from the Mesa Verde bed in Utah and was non-coking.

The oil from the gas produced when Mesa Verde coal was heated at a maximum temperature of about 725 deg. cent. (1337 deg. fahr.) by means of superheated steam was examined as to its composition. The amount of oil recovered was about 7 cc. per kg. of coal or 1.7 gal. per ton.

This oil, which boiled from 20 deg. cent. to slightly above 200 deg. cent., resembled casinghead gasoline in its physical properties, but was unlike it because of its high content of unsaturated hydrocarbons (olefins). It contained about 30 per cent of amylenes, about 10 per cent of pentane, which was largely (about 80 per cent) isopentane. About 26 per cent of the oil was made up of 6 carbon-atom compounds, of which one-third was saturated and largely cyclic and two-thirds consisted of a mixture of hexenes. The seven carbon-atom compounds were estimated to amount to about 17 per cent, of which two-fifths was saturated and consisted largely of paraffins-heptanes, and the other three-fifths was divided nearly equally between straight-chain (heptanes) and cyclic olefins. The portion corresponding in boiling range to the eight carbon-atom hydrocarbons equaled about 8 per cent of the oil. Slightly over half of it possessed the properties of cyclic olefins, and the remainder was saturated and about three-quarters naphthenic. The remaining 9 per cent, boiling from 125 deg. cent. to slightly over 200 deg. cent., consisted of about equal parts of saturated and unsaturated hydrocarbons, possessing the physical properties of the corresponding naphthenic compounds. The amount of acids and bases in the light oils was very slight.

Results of this study are given in *Bulletin 31, Mining and Metallurgical Investigations* by R. I. Brown, organic chemist, United States Bureau of Mines, and R. B. Cooper, research fellow, Carnegie Institute of Technology. Compare *Power Plant Engineering*, vol. 31, no. 19, Oct. 1, 1927, p. 1044, *e*)

GAS PRODUCERS AND PRODUCER GAS

A Mechanical Water-Gas Generator

This article deals with an experimental generator designed about two years ago by the engineers of the United Gas Improvement Co. and installed on one of the sets of the Philadelphia Gas Works. The apparatus has only recently been started up, and results obtained even on intermittent operation are said to have demonstrated the great savings which may be accomplished with mechanical generators.

In the first place, the task of clinkering, requiring many hours of hard and hot labor is eliminated. Practically all of the clinker is removed without shutting down the generator, and but one-half hour out of each 24 hours is consumed in dumping the small amount of ash which accumulates in the hopper bottom of the generator. This not only results in an increase in the allowable gas-making time, but reduces the amount of labor required in the generator house to a minimum.

The water-gas set on which the mechanical generator is installed is completely equipped with hydraulic operation and automatic control, and therefore the entire operation in the generator house

is handled by one man and the major portion of this man's time is consumed in general supervision of the apparatus, reading meters, gages, etc.

The mechanical generator has a grate area of 58.99 sq. ft., which is $7^1/_4$ per cent less than the grate area of a standard 11-ft. water-gas generator. The results given in a table in the original article show that the average "make" per $23^1/_2$ hr., using 2.60 oil was 3767 M, which is equivalent to 64 M per sq. ft. of grate. Comparing this with the gas made on a standard 11-ft. generator, using the same oil per M, shows an increase of 19.4 per cent in favor of the mechanical generator.

In considering the generator fuel per M, attention must be called to the fact that part of this fuel is used in generating low-pressure steam in the water jacket of the mechanical generator. Therefore, in comparing the fuel results with those obtained on a standard water-gas generator, allowance should be made for the fuel used in evaporating the jacket water. The net generator fuel, therefore, would be lower than shown after giving credit for the steam generated.

This brings up another advantage of the mechanical generator which with a waste-heat boiler makes a very desirable combination for steam production for gas making. High-pressure steam is generated in the standard U.G.I. blast-gas boiler, and low-pressure steam is generated in the mechanical-generator water jacket. Connecting these sources of steam supply through suitable regulating valves permits the operation of the set with low-pressure steam. Another connection should be made to the live-steam supply in the works as there will be times when the demand for steam will exceed the supply from the waste-heat boiler and mechanical-generator jacket.

Two tables showing the operating results with the mechanical generator are given in the original article. (T. B. Genay, U.G.I. Co., Philadelphia, Pa., in *Gas-Age Record*, vol. 60, no. 16, Oct. 15, 1927, pp. 568–574, *e*)

INTERNAL-COMBUSTION ENGINEERING (See also Motor-Car Engineering: The Riley Engine and Car)

The Atlas Valveless Aircraft Motor

A radial air-cooled aircraft motor is being produced by the Aircraft Holding Corporation of Los Angeles, Cal. Two sizes are said to be made—one, of 120 hp., is a stationary radial having eight cylinders and weighing with supercharger 260 lb.; the other, the Ajax, is a 6-cylinder 80-hp. intended chiefly for use in instruction machines and flying-club equipment. These engines operate on the two-stroke cycle. No details of design are given, except that it is said that the cylinder head is machined integral with the barrel, the only openings in it being the spark-plug holes. (*Automotive Industries*, vol. 57, no. 16, Oct. 15, 1927, p. 587, 1 fig., *d*)

MACHINE PARTS

Wooden Mill Bearings

In report No. 53 of the Rolling Mill Committee of German Ironmasters (*Stahl und Eisen*, Sept. 8, pp. 1483 to 1485), A. Hülsewig recommends the insertion of wooden blocks or disks in the bronze bearings on mills. Experiments were made at the Hamm works of the Vereinigte Stahlwerke, Westfälische Union, some bronze bearings on the wire mills having been worn out in a week. Disks of African ironwood were mounted flush in the surface and collars of the bearings. The way in which this was done is not explained, but it is stated that the composite bearings are cheaper than the metal bearings, and that their life is much longer. Solid wood bearings were also tried with good results, the wear on the end blocks being very bright. One case is mentioned in which a bearing has been kept in service for a year, without the wood being renewed. An additional advantage of the wood is the reduced consumption of cooling water. The cost of the maintenance of the bearings at Hamm is said to have been reduced to one-tenth its former amount. (*Engineering*, vol. 124, no. 3221, Oct. 7, 1927, p. 473 *g*)

MACHINE SHOP

Running-In Worm Gearing by Burnishing

At the Columbia Axle Co. of Cleveland which supplies the worm drive axles for the Jordan model-R cars, the gears in hobbing are left from 0.002 to 0.004 in. large on the radius in order to provide sufficient stock for the special running-in process used at that plant. The first operation is to check the gears in a special fixture in order to find out as to about how long the running in must be continued in order to bring the gear to the exact size.

The running-in machine consists essentially of a set of fixtures in which the gear can be placed on exact centers with a burnishing tool which is an exact reproduction of a standard worm. The burnishing tool is operated by a 15-hp. electric motor, while the gear shaft is equipped with brakes by means of which loads of varying amounts can be applied.

The gear is placed in position on its shaft, a lever being used to lower the burnishing tool so that the gear may be placed in position. The tool is then raised to position in exactly the same relationship to the gear that the worm will have in the assembled axle, and the power is turned on.

The threads on the burnishing tool are accurately ground to duplicate in contour the threads of the production worm, and they are serrated to give the effect of an unrelieved hob. This tool therefore acts with a slight cutting effect if there is any discrepancy in the gear teeth or any other irregularities due to inaccurate cutting or machine chatter. It is said to act as a burnisher which condenses the metal of the gear teeth and causes it to flow until it fits perfectly with the threads of the burnishing tool.

By applying loads of various intensities through the medium of the brake on the wormwheel shaft, the operator is able to hasten or retard the burnishing operation, depending upon how far the gear was originally from perfection. The primary inspection gives the operator an indication in the burnishing process, and experience tells him about when the work should be completed. After taking the gear out of the machine it is again checked on the inspection device and is returned to the burnishing machine for further working if it has not reached perfect condition.

It is claimed that the burnishing operation produces condensation of the metal and results in having gear teeth with glass-smooth surface. Hence no road work is required before the axle will run smooth and silent. (K. W. Stillman in *Automotive Industries*, vol. 57, no. 16, Oct. 15, 1927, p. 583, *d*)

MECHANICS

The Whirling Speed of Shafts

The present article considers the "new whirling speed" discovered some years ago by Prof. W. Kerr when running a 250-kw. impulse turbine. This speed was then found to be much lower than the true whirling speed. The author of the present article when experimenting with a loaded shaft carrying axle loads noticed that a decided disturbance occurred long before the whirling speed proper. This disturbance was found to take place at half the latter whirling speed, and disturbance could not be detected at other speeds. Similar results were obtained with variously loaded shafts, and even with a carefully ground unloaded shaft. In order to assist in detecting the new whirling speed a long flat spring was allowed just to touch the shaft, and any vibration taking place was thus easily detected. The arrangement is illustrated in the original article.

Professor Kerr's experiments and mathematical treatment seem to indicate that the new whirling speed occurs at a speed about three-quarters of the whirling speed proper. The present author has devised apparatus illustrated in the original article to determine the new whirling speed; a decided disturbance occurred at 540 r.p.m., and no other disturbance could be detected until the whirling speed occurred at 1100 r.p.m. The relation between the new whirling speed or vibration speed and the whirling speed proper was here therefore 0.491. This agrees with previous mathematical deductions of Prof. A. Stodola. (T. M. Naylor in a paper before Section G of the British Association, Sept. 7, 1927, abstracted through *Engineering*, vol. 124, no. 3221, Oct. 7, 1927, p. 474, 4 figs., *eA*)

Investigation of Torsional Vibration with Particular Reference to Aircraft Engines

There is available a vast amount of published information on the general subject of vibration, but on examining this it will be found that very little work, mathematical or experimental, has been done on the particular problems which have to be considered by the designer of a machine liable to suffer from critical periodic torsional vibration of its shafting. This lack of investigation is perhaps largely due to the fact that serious torsional vibration of the shafting in any machine may occur without any externally apparent indication of anything abnormal in the running of the machine.

The absence of visible symptoms is the greatest danger in a case of critical torsional vibration, as the first indication that anything unusual is happening is only given when the shaft actually breaks. Even then the trouble is rarely put down to vibration, but is probably considered to be either faulty material or fatigue of the metal; a new shaft is substituted and, as may be expected, it fails, in the same manner, after a short period in operation. Frequently the final result is that the machine is scrapped because of its unreliability, whereas it might, with slight alteration, have become entirely satisfactory.

In many cases, where trouble has been experienced due to torsional vibration, damping devices have been used in order to make the machine satisfactory in operation; while a machine may, with heavy damping, run at a critical speed without fracture of the shaft, it is not, under these conditions, running economically. The author was able in one case to measure the loss due to this cause, and found that at the critical speed the power absorbed in damping was over 50 per cent of the total power developed by the engine at that speed.

Damping having been shown to be an unsatisfactory method of overcoming vibration troubles, we are left with only one alternative, that is, to arrange the shafting of an engine in such a manner that the critical speeds are all either below or above any speed at which the machine may be required to operate continuously in service.

The author proceeds to give a list of previous investigations on this subject. When first starting to investigate this subject the author noticed that in all published work the assumption was made that masses were connected by weightless shafts. This assumption greatly simplified the expressions that were obtained for the natural frequency of vibration of any system, but it also limited the number of solutions of the expression to one less than the number of heavy masses comprised in the vibrating system. Furthermore, there is no such thing as a massless shaft.

In general, the author's investigations have led him to the conclusion that if the length of shaft in feet between any two masses is less than one thousand divided by the highest frequency per second of forced vibration that the system may be subjected to, then the mass of that shaft may be neglected. If, however, the length of shaft between any two masses in the system is greater than that shown by the expression given above, then the mass of that shaft must be considered in the calculation of the natural frequency of the system, as it will have considerable influence on the results obtained. From the expression given above it will at once be apparent that the mass of the length of shaft between cranks in an airplane or airship engine may be neglected in the calculation of natural frequency of the system. Further, in most airplane engines the mass of the shaft between the engine and the propeller may be neglected. When, however, one turns to the consideration of airships it will be seen at once that the length of shafting between engine and propeller is frequently such that its mass cannot be neglected, and expressions for the natural frequency of vibration must include a term for the moment of inertia of the mass of these shafts.

The formula which the author has derived for various types of engines with a number of different arrangements of the shafting and gears (if any) between engine and propeller are given in an appendix, which also gives methods for calculating the natural frequency of vibration of an engine. The frequency and amplitude of the torque variations may be found by constructing a turning-moment diagram for the engine, and knowing this, one may find where synchronism between the natural frequencies and the frequencies of torque variation causes a critical speed. Critical speeds which fall close to the speed range of an engine are only dangerous if the torque variation factor which causes them is large. In addition to the torque variation as the cause of destructive vibration should also be mentioned as a dangerous source of possible trouble the occurrence of periodic errors in the cutting of the gearing. On the other hand, in a geared system (unless epicyclic gears are used) the torque fluctuation has a reaction on the gear bearings which causes a vibration of the engine itself and thus serves as an indication of trouble. (James Calderwood in *Journal and Record of Transactions, The Junior Institution of Engineers*, vol. 37, pt. 12, Sept., 1927; original paper, pp. 607–617, discussion 617–622, *mpA*)

Computation of Drop of Pressure in Gas Mains and Brick-Lined Passages

In a previous publication the author considered the matter of friction losses in the flow of gas through brick-lined passages. He found there at low velocities, say, up to 3 m. per sec. (9.84 ft. per sec.) the losses were twice as high as those found in accordance with the Brabbée and Fritsche formula for smooth metal pipes, and above that velocity, 1.5 times as great. The frictional resistance R was therefore found to be

$$R = b \times \gamma^{0.852} \times \frac{v^{1.924}}{d^{1.281}} \qquad [1]$$

where b is a constant equal to 5.66; γ is the specific weight of the gas in kilograms per cubic meter at t deg. cent. and an absolute pressure of p atmos.; v is the effective velocity of flow of gas in meters per second, and d the inside diameter of the pipe in millimeters. There is no question as to the difficulty from the point of view of consumption of time of making calculations with this formula, particularly because γ and v have first to be computed from the known amount of gas V handled. Even with this knowledge it is only possible to compute R by using logarithms. In order to avoid these tedious calculations, the above formula for R has been recomputed for V at 0 deg. temperature and 760 mm. pressure. This had to be done because the table prepared by Brabbée for the graphic determination of frictional losses does not go as far as to cover the range used in metallurgical work. The new formula is of such a character that only simple linear and quadratic relations are used on the assumption that there has been found the relation between the volume of gas flowing in cubic meters per second and the cross-section of flow, and hence v_0 in meters per second. The values for γ_0 vary then from 0.5 to 1.4 kg. per cu. m., which covers practically all the gases coming within ordinary engineering work, from coke-oven gas to smokestack gases. For all of these gases the following holds good:

$$f(\gamma_0) = 0.12 + 0.875\,\gamma_0$$

As to the temperature relation for temperatures from 0 to 2000 deg. cent., the following holds good:

$$f(t) = 0.95 + \frac{4.3 \times t}{1000}$$

To make the determination of the friction losses still simpler, the factors of Equation [1] expressing R for $\gamma_0 + 1.293$ kg. per cu.m. are presented in their mutual relation in two tables (not reproduced in *Stahl und Eisen*) for pipe diameters from 5 to 3250 mm., for velocities v_0 from 0 to 20 m. per sec., and temperatures from 0 to 2000 deg. cent. With these tables it becomes an extremely simple matter to read off the pressure losses occurring under a given set of conditions.

Should the velocity or diameter be found to be beyond the range of these tables, it is only necessary to select some other velocity or diameter, read off the friction losses for the diameter of velocity so selected, and multiply the friction loss so obtained by the 1.924 power of the desired velocity, or to divide by the 1.281 power of the diameter. The same seems to apply for all other purposes, this matter being covered by auxiliary tables. (Dr. of Engrg. Hugo Bansen, Rheinhausen, in a paper published in full in *Archiv für Eisenhüttenwesen*, vol. 1, 1927, pp. 187–192. Abstracted through *Stahl und Eisen*, vol. 47, no. 40, Oct. 6, 1927, pp. 1664–1665, *p*)

MOTOR-CAR ENGINEERING

The Six-Cylinder Sensaud DeLavaud

THIS CAR was shown for the first time at the recent Paris Automobile Show. It is equipped with the Sensaud DeLavaud transmission (see MECHANICAL ENGINEERING, vol. 46, no. 1, Jan., 1924, p. 46), in which the propeller shaft drives a swash plate to which are mounted six connecting rods imparting impulses to a free-wheel rear axle. The greater the inclination of the belt, the longer the stroke of the rods, the greater the arc of the circle described by the axle, and hence the higher the gear ratio. As the driver has nothing more to do than press on the accelerator in order to vary the speed, the handling of the car is very much simplified.

The frame instead of being, as in the conventional practice, an assembly of side rails and cross-members riveted or bolted together, is a one-piece casting in Alpax metal (an alloy of aluminum and silicon treated with metallic sodium). The frame includes in this case the floor boards, the instrument board, spare-wheel and luggage carrier, and other accessories. The body is little more than a protection against wind and rain. The frame has a tunnel for the drive shaft, four wells for the passengers' feet, a platform on which seats are located, and an Alpax dashboard bolted to it.

The frame is very rigid and as it carries the entire load (passengers, baggage, battery, spare wheels) it is possible to make the body very light. In itself this one-piece construction is lighter than the assembled type of frame.

Another feature of the car is the apparent absence of any form of suspension. There are no laminated or coil springs. Mounted on the rear of the frame just above the axle housing are two vertical steel tubes (not visible externally) each of which serves as a guide to a rod having a bronze-bushed spherical attachment to the outer extremity of the axle housing and carrying a large number of superimposed rubber disks. This rubber is of very special quality, and it is claimed is capable of maintaining its resilience for a period of twenty years. The spherical attachment of the rods to the axle housing permits one side to rise independently of the other without any thrust on the walls of the cylinder.

There are several other unusual features which cannot be described here in full, because of lack of space. For example, the front axle is rather similar to the rear-axle casing of a light car and is of a pressed-steel welded banjo type. The steering is also somewhat unusual. The transmission has been referred to before, the most interesting feature of the new design being the use of the free wheel. (*The Autocar*, vol. 59, no. 1664, Sept. 23, 1927, pp. 561–564, illustrated, *d*)

The Riley Engine and Car

THE Riley is a small British car officially rated at 9 hp. but developing 32 b.hp. at 3800 r.p.m. with a compression ratio of $5^1/_2$ to 1. This efficiency in power output is promoted by the shape of the combustion chambers, each of which is a true hemisphere with almost flat-top pistons and is machined all over, including valve ports in the detachable cylinder head. The valves are of the overhead type with two camshafts actuating push rods and rockers mounted in the crankcase. A train of helical gears is used for the distribution, and to prevent "snatch" at the gears each camshaft has a balancing cam acted upon by a spring-backed plunger.

Another feature of note is the suspension of the unit power plant in the frame. Integral with the combined cylinder block and crankcase, and slightly in front of the center, are two large bosses, one at each side, with a conical interior; inside each cone is a thick conical rubber sleeve, and inside this a metal cone. Passing through the holes in the latter is a $1^1/_8$-in. steel bar, which passes between the first and second connecting rods, its ends being carried in brackets attached to the frame. This arrangement affords a rubber-buffer trunnion mounting on which the engine is free to rock and twist within limits. Within the crankcase the bar is encircled by a seamless steel tube with oiltight joints at each end. The third support for the unit is at the extreme rear end, below the gear-set extension forming the spherical housing for the torque ball. From the extension a bolt projects down and passes through a horizontal plate secured to a cross-member between two thick rubber pads. Thus the power plant as a whole "floats" on rubber.

Four speeds are provided by the gear set, in which the main shaft runs on ball bearings and the layshaft on plain bushings. A notable feature of the design is that both the constant mesh and the third-speed gears have helical teeth (23-deg. angle), giving almost equal quietude on third as on the direct top. The third-speed gears are also constantly in mesh and are brought into use as follows: On the main shaft is a sliding sleeve, castellated inside and out; at one end it has square dog teeth for the direct drive, while at the other end are teeth engaging with internal teeth on the third-speed driven gear. Encircling this sliding member are the sliding gears of the first and second speeds. The reverse is gained by a double-width pinion, normally stationary, brought into mesh with the first-speed wheels. (M. D. Bourdon in *Automotive Industries*, vol. 57, no. 17, Oct. 22, 1927, pp. 624–627, illustrated, *d*)

The Free-Wheel Smooth-Sided Vulcan

THE Vulcan car is of unusual design in two respects. In the first place, it is equipped with a free-wheel mechanism (see MECHANICAL ENGINEERING, vol. 49, no. 9, Sept., 1927, p. 1018), and in the second place the body has no projections whatsoever, the running boards, luggage compartment, and spare-tire carrier being all inside when the doors are closed. The free-wheel device consists of an extension housing behind the gear box, which contains a roller-ratchet mechanism on the gear tailshaft. Concentric with this is a face-toothed ring into which can be meshed a similar ring splined to the tailshaft. When these two rings are brought together by the lever control the drive is solid, but when they are separated the free wheel can operate and the car will overrun the engine freely. To assist in the meshing of the face teeth when a solid drive is required, a small spring-loaded friction ring surrounds the whole assembly, and this engages with the slidable plate before the teeth engage, so spinning the gearshaft up to the speed of the transmission shaft before the teeth meet. In practice with the free wheel in action, it was found possible to change gear on the ordinary Vulcan four-speed gear box at any speed, and from any gear to any other gear without using the main clutch, merely by decelerating the engine as the gear lever was moved. When the free-wheel device was locked—which can be done at will and silently—the driving of the car is of course absolutely as normal.

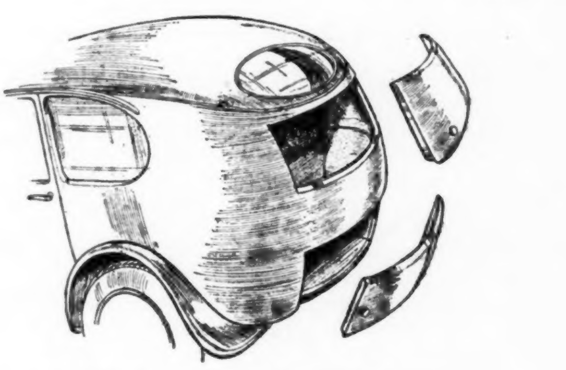

FIG. 1 REAR PART OF THE VULCAN CAR BODY

The device is optional and is supplied at a special charge of £25 (say, $125). The body arrangement is shown in Fig. 1. The body embraces the full width of the car from hub cap to hub cap, the rear fenders being sunk in the body sides so that only the flange projects. The running boards appear only when the doors are opened. The width of the body gives roomy seating accommodation. The front seat has a maximum width of 52 in. so that three people can sit upon it without unduly crowding the driver, and even so the seat does not come close up to the doors, and hinged arms are provided at either side.

Behind the back of the rear seat is a large compartment for luggage with access from the outside through a flush detachable panel. A similar panel still lower down on the back covers a receptacle for the spare wheel. (*The Autocar*, vol. 59, no. 1665, Sept. 30, 1927, pp. 594–595, *d*)

OIL ENGINEERING (See Air Engineering: Gas-Lift Pumping)

POWER-PLANT ENGINEERING

Statistics of Power Generation

THE TOTAL amount of electricity produced at public-utility power plants in 1926 was 73,791,000,000 kw-hr. according to a statement just made public by the Geological Survey of the Department of the Interior. The use of fuel oil in generating electricity has declined since 1924, when it reached its maximum, and less fuel oil was used in 1926 for this purpose than in any other year since 1918. Indeed, in 1926 the amount of fuel oil consumed by public-utility power plants was only 57 per cent of that used in 1924.

Average rates of consumption of the different kinds of fuel in generating electricity in the United States were as follows: Coal, 1.94 lb. per kw-hr.; oil, 243 kw-hr. per barrel; gas, 22 cu. ft. per kw-hr. The best fuel rates for these different fuels were about as follows: Coal, 0.9 lb. per kw-hr.; oil, 540 kw-hr. per barrel; gas, 13 cu. ft. per kw-hr. As these are roughly one-half the average rates, the consumption of fuel by electric public-utility power plants would be reduced one-half if all public-utility power plants produced electricity at the best fuel rates and the attainment of this degree of efficiency would have conserved more than 20,000,000 tons of coal in 1926, representing a value of about $75,000,000. (*Power Plant Engineering*, vol. 31, no. 20, Oct. 15, 1927, pp. 1088, *s*)

Boiler Units at Plant of Harnischfeger Corporation

THIS installation is interesting in that the latest devices, such as water-cooled furnaces and air preheaters, were adopted for a comparatively small unit. The plant consists of four boilers of which two are of the standard Badenhausen economizer type, each of 300-hp. rating, set together and fired by Riley underfeed stokers. The two new units are Badenhausen four-drum water-tube boilers, each rated at 425 hp. They are set in battery equipped with Badenhausen superheaters, and make steam at 160 lb. pressure, 100 deg. superheat.

The furnace is refractory up to a line just above the stokers, and the front and side walls are water cooled the rest of the way. The $3^1/_4$-in. water-cooling tubes connecting to headers at the bottom and at the top are curved to connect with the drums of the boiler. The space between the tubes is filled with Plibrico, about one-fifth of the tube surface being left exposed. The results obtained with the new boiler units are said to have been extremely satisfactory. In a test run on one of these new boilers it was found that at 192.6 per cent of rating for 9 hr. the efficiency of the boiler, superheater, air heater, furnace, and grate was 84.16 per cent, based on fuel of 13,101 B.t.u. per lb. as fired. (*Power Plant Engineering*, vol. 31, no. 20, Oct. 15, 1927, pp. 1084–1085, 4 figs., *d*)

REFRIGERATION

Domestic Refrigerators and the Ice Business

BECAUSE of the interest in what is likely to happen to the ice business as a result of the development of the so-called domestic refrigerator, the following statement by Harry Merrill Hitchcock, president of The American Ice Company, may be of interest.

> What is more, it would surprise you to see how many people who own machines are still on our books; and using nearly as much ice as they ever did. A home machine is the finest device for increasing ice consumption you ever saw. It is so handy and attractive, they find themselves using far more ice than they did before.
>
> They lavish those neat little cubes in iced drinks; they get a lot of fun out of making desserts and so on—pretty soon they find the machine whose capacity looked ample when they bought it, can't keep up. Then they have some guests, and the day is hot; and the iceman gets an order. Before long he is pretty near as regular a back-door caller as he ever was.
>
> This parallels exactly our experience with the large commercial user. Most of these people are on our books today, and the total of our commercial business is at least as great as it was before 1914. This is because their best plan has proved to be to use their own plant for basic, constant needs, and rely upon us for all requirements beyond that point.
>
> Many of them have refrigerating equipment, but no ice-making facilities. It is cheaper and better for them to buy all the ice they need from us, keep their own plants running steadily and avoid the necessity of carrying the big capital investment that a completely self-contained plant large enough for all demands would entail.

(*Printers Ink Monthly*, quoted through *Refrigerating World*, vol. 62, no. 10, Oct., 1927, pp. 19–22, *g*)

Certain Physical and Chemical Properties of Methyl Chloride

ONE OF THE important considerations in choosing a refrigerant is that of piston displacement per unit of refrigeration, especially where space is limited. The last column in a table in the original article shows the piston displacement, using the various refrigerants referred to that of carbon dioxide as unity, whereas the sixth and seventh columns show the suction and the condenser pressures for these operating temperatures. In this table the piston displacement per ton of refrigeration per minute using sulphur dioxide is 9.08 cu. ft., whereas that of methyl chloride is 6.49, so that a compressor using methyl chloride would have a capacity of nearly 50 per cent more refrigeration than a similar one would have using sulphur dioxide. However, the methyl chloride condenser pressure (as well as the suction pressure) would be considerably more than that of sulphur dioxide. In no case in temperate climates does the condenser pressure exceed 150 lb. if the condenser is an efficient one and the amount of air circulated through it is sufficient in amount.

Methyl chloride is said to be substantially non-poisonous under ordinary conditions of operation. It will burn, and with certain limited mixtures it will explode, but the danger due to this is small. No convenient chemical can be used to detect leaks of methyl chloride. The authors give also a table showing the thermodynamic properties of methyl chloride as well as a P.I. diagram for that substance. The table is not original.

Since oil and methyl chloride are miscible, some oil may be carried along with the refrigerant into the expansion chamber, This will have an effect on the boiling point of the liquid in the expansion chamber and thus will have some effect on the temperatures that can be reached in the refrigerator. Pure methyl chloride at ordinary pressures boils at —9.4 deg. fahr. Addition of oil increases this temperature less than might be expected, since a mixture of 50 per cent each of oil and methyl chloride boils at about —4 deg. fahr.

A review of the chemical properties of methyl chloride shows that it is very stable, non-corrosive, not easily inflammable, and relatively non-toxic, and hence from the chemical standpoint should be very suitable for use as a refrigerant. In this work the question of hydrolysis was not considered as the conditions, as those of ordinary practice, were anhydrous. [H. J. Macintire (Mem. A.S.M.E.), C. S. Marvel, and S. G. Ford, University of Illinois, Urbana, Ill., in a paper presented before the Spring Meeting of the American Society of Refrigerating Engineers, May 23–25, 1927, Abstracted through *Refrigerating Engineering*, vol. 14, no. 4, Oct., 1927, pp. 115–120 and 138, 2 figs., 9 tables, *eA*]

TESTING AND MEASUREMENTS

Measurements of Pressures of Bearings of Rolling Machinery

TWO METHODS have been developed in this connection: one known as the Brinell method, and the other as the pressure-gage method. The equipment in both cases is very simple. In the Brinell method the mill screws on the machine are loosened and instead of the breaker blocks two hardened steel plates are inserted. These plates have spherical recesses in them and balls are placed in the recesses. When the machine is loaded the plates which rest on the bearing chuck receive Brinell impressions from the balls of a depth governed by the pressure exerted by the action of the material passing through the rolls. When the rolling operation is completed the plates are removed and the impressions made by the balls on the plates are measured. The plates are then taken to the laboratory where each impression is duplicated singly under an Olsen machine on the same plate and as near the original impressions as possible. The load required to duplicate the impression gives a measure of the pressure on the bearings. The original article shows in detail how to carry out the calculations.

The pressure-gage method can be used where conditions do not

favor the use of the Brinell method. The apparatus consists of a specially designed hydraulic-plunger mechanism directly connected to a standard recording pressure gage. In operation the plunger is forced into the cylinder by the pressure caused by the bench between the bearing chuck and the mill cap plus the action of the material passing between the mill rolls. The pressure on the cylinder is transferred to the recording gage and is read directly from the chart.

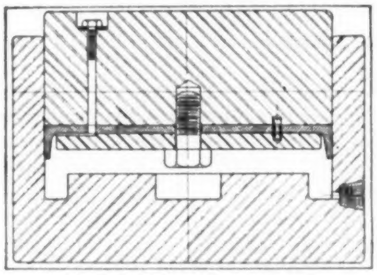

Fig. 2 Section of Plunger Mechanism Developed for Obtaining Load Pressures on Rolling Machinery

Since the plunger mechanism was specially developed for this work, a brief description of it may be of interest. From the section shown in Fig. 2, it will be seen that the device consists of two parts, a cylinder which has an inside diameter of 9 in., and a plunger. In operation the space between the plunger and the cylinder head is filled with glycerine. Connection with the recording gage is afforded by means of a tube which is screwed into the threaded opening at the right of the cylinder.

The plunger consists of three parts, the plunger proper, a leather gasket, and a steel plate which holds the gasket in place assembled as shown. It is also equipped with a valve which provides an escape for any air that may be trapped in the process of filling the cylinder with glycerine. An outlet to the valve between the plate and the gasket is provided by a notch machined in the upper face of the plate. After the gasket has become thoroughly saturated with glycerine, and all the air is forced out, the apparatus can be calibrated permanently with respect to the scale readings appearing on the indicating pressure gage. (P. H. Frank in the *Iron Trade Review*, vol. 81, no. 16, Oct. 20, 1927, pp. 965–966, 3 figs., *d*)

THERMODYNAMICS

The Transfer of Heat in Cylinder Walls

The lecturer, a professor at the Technische Hochschule in Dresden, first discussed previous work beginning in about 1884. He pointed out that at any instant the interchange of heat between steam and wall at any point of contact depends first upon the temperature of steam and wall at the point in question, and, second, upon the coefficient of heat transmission or transfer. Under uniform conditions of running there exists at each point of the wall a certain mean temperature which corresponds to the condition that the heat supplied by the steam to the point is equal to the heat conducted from this point of the wall to the outside in accordance with the law of heat conductivity. On account of this the mean temperature of each point of the wall compared with mean temperature of the steam in contact with it is dependent on the temperature of the outside of the wall, the wall thickness, the coefficient of heat transmission α and the coefficient of heat conductivity λ of the metal of the walls. The bigger the value of α the more the mean temperature of the wall will approach that of the steam; the greater the coefficient of conductivity λ of the wall the lower will the mean temperature of the wall under the same condition fall below that of the steam. The mean temperatures referred to here are the mean values for one cycle at any point under consideration. These mean temperatures will under uniform conditions remain constant at each point, but will change from point to point under the influence of the design of the cylinder, the engine speed, the point of cut-off of the steam, the condition of the admission steam, and so on.

The lecturer then proceeded to present the history of the development of ideas on the subject of transfer of heat. Among other things, he pointed out the remarkable fact computed from the test data of Donkin that the mean temperature of the wall during the cycle is always appreciably higher than the mean temperature of the steam, even when the engine is jacketed. Further, the average temperature of the wall becomes higher with a later cut-off.

Further referring to the same tests Professor Nägel pointed to the fact that in eight tests of Series 6 and 7—four tests with saturated steam and four with superheated steam—without steam in the jackets, the mean temperature of the inner wall was from 12 deg. to 27 deg. cent. lower than the temperature of the admission steam when saturated steam was used, the cut-off being varied from three-quarters to one-quarter stroke, respectively, and from about 38 deg. to 50 deg. cent. lower when the engine was using superheated steam over the same range of cut-off. Still earlier cut-off caused still larger temperature differences, while jacketing naturally reduced these values appreciably. From these tests it was established that the differences of temperature between steam and wall are, in each case, much larger than had been assumed by Fliegner in his calculations of the coefficient of heat transfer, and that therefore the coefficient is appreciably smaller than he stated.

The work of Callendar and the late Professor Nicolson is next considered, with special reference to condensation of steam due to adiabatic expansion. Little is known at present concerning the diameter of the water drops formed as moisture content in steam by adiabatic expansion.

From the mean temperatures of the walls, which may be assumed to be determined at a sufficient number of points of the wall, inside and outside, the heat quantity which is conducted through the cylinder wall to the outside may be conducted. This heat is delivered from the outer surface of the walls to the immediate surroundings and constitutes a loss. In addition to the heat quantity passing to the outside, there is, at each point of contact of steam and wall, another heat quantity of great importance. This is the heat transferred from the steam to the wall at one part of the cycle, when the temperature of the steam exceeds that of the wall, and which is transferred back from the wall to the steam at a later part of the same cycle, when the wall temperature is higher than the steam temperature. While the first quantity flows only in one direction, the other changes its direction, to and fro, giving an oscillating or fluctuating heat quantity. The magnitude of this latter quantity at each point of the wall and at every instant—or at every crank angle—will depend upon the temperatures of the steam and wall momentarily existing. Under this influence the temperature of the inside of the cylinder wall will rise and fall. These changes of temperature, following the laws of heat conductivity, will continue into the interior of the wall, but diminishing rapidly in magnitude with the depth.

Professor Nägel expressed the hope that the tests now being undertaken by several workers to investigate the atomizing process of fuel in Diesel engines may shed light on this analogous problem. Callendar and Nicolson computed 0.0006 mm. as the diameter of the water drops. If this be accepted, then 1.0 per cent of moisture in 1.0 kg. of steam should contain 8.84×10^{13} drops with a surface of 100 sq. m. Using in the calculation the value of the coefficient of heat transfer recently determined by Professor Nusselt, of Munich, $\alpha = 50{,}000$ kg-cal. per deg. cent. per sq. m. per hr., the fall of temperature should be only 0.45 deg. cent. at 100 r.p.m. and 2.2 deg. cent. at 300 r.p.m.

In spite of the fact that these phenomena, which were investigated originally by Callendar and Nicolson, can scarcely have any immediate practical importance, Professor Nägel held that they give an interesting view into the mechanism of condensation and may also disclose facts concerning heat transmission that may be of future importance. The investigations of these two workers constitute the first successful attempts which have been made at indicating the temperature ranges in steam engines. (This is the first of a series of four lectures at the Institution of Civil Engineers, delivered on Oct. 11, 1927, by Prof. Adolph Nägel, Technische Hochschule, Dresden. Abstracted through *The Engineer*, vol. 144, no. 3744, Oct. 14, 1927, pp. 420–421, *tgA*)

CLASSIFICATION OF ARTICLES

Articles appearing in the Survey are classified as *c* comparative; *d* descriptive; *e* experimental; *g* general; *h* historical; *m* mathematical; *p* practical; *s* statistical; *t* theoretical. Articles of especial merit are rated *A* by the reviewer. Opinions expressed are those of the reviewer, not of the Society.

Engineering and Industrial Standardization

Rubber Association of America Approves A.P.I. Rubber-Belting Standards[1]

THE American Petroleum Institute reports in a recent circular that representatives of the Rubber Association of America have approved the tentative Petroleum Institute's standards for rubber belting.

The Institute states that carefully prepared records show that belting constructed in accordance with the new standards is giving superior service under operating conditions in the field. The Institute recommends that oil companies hereafter buy their belting only on the basis of the A.P.I. standards. They urge, moreover, that the purchaser test the belting purchased and retain a sample of belting from each roll, so that tests may be made in the event the material supplied does not stand up in service as expected.

Recent press releases regarding the meeting of the Institute at Colorado Springs indicate a saving of some two hundred million dollars annually as the ultimate goal of the Institute's standardization campaign. This will be brought about through the use of equipment, tools, and supplies manufactured in accordance with standards and specifications of the Institute. The work, which is being participated in by executives of many leading companies, is relied upon to eliminate much economic waste, through reduction of manufacturers' stocks, more prompt shipments, simplification of field operations, and far more extensive interchangeability of equipment.

The Standardization of Agricultural Products[2]

THE U. S. Department of Agriculture has been concerned with standardization ever since the Bureau of Markets, now the Bureau of Agricultural Economics, was organized in 1913. The work of the Bureau is financed by appropriations totaling about $5,000,000 annually; none of this amount is definitely allocated to standardization, but about $2,000,000 is spent annually in research and general educational work which relates more or less directly to standardization.

In running a manufacturing plant, barring a few difficulties, it is possible to manufacture to a single standard, but this cannot be done in agriculture as there are something like 6,000,000 "manufacturing plants" to deal with, and weather, soil, and other conditions are involved over which man has no control.

As there was no trade organization which could well undertake the standardization of agricultural commodities, and as standardization was vital to progress in marketing work, the Bureau of Markets assumed the task. Among the first laws passed by Congress for the guidance of the Bureau of Markets was a broad act which merely authorized it to develop national standards for agricultural products. Later came a law which made the use of these national standards compulsory when shipping grain in interstate commerce, and directed that every shipper of grain undergo supervision and inspection. A less rigid compulsory law affects cotton, but no inspection is required unless a shipment is made against contract. Since 1916, however, no more compulsory laws have been passed, as it has been possible to make rapid progress through educational activities and the good results already secured through the work.

Standards have now been formulated for practically all major farm products, including grain, cotton, hay, live animals, meats, wool, fruits, and vegetables. Difficulties are involved, because in practically every case we are dealing with living organisms. Deterioration and the weather are factors over which the producer has no control, and they affect products so seriously that to produce goods that will meet specific standards is often difficult if not impossible.

After research work on the standards for a given product has apparently been completed, and after the proposed standards have been tried out commercially, public hearings are held in leading cities. The Department sends experienced commodity men with exhibits and data to these meetings. All controversial points are then reconsidered, and a final hearing is held in Washington before the standards are finally promulgated.

Following the acts providing for standardization, Congress passed a law providing for inspection of shipments of farm products by Federal inspectors. In some instances this inspection is compulsory; in others it is made only on request. Approximately 200,000 cars of fruits and vegetables, comprising about one-fifth of the total tonnage last year, were inspected and certified by Bureau inspectors. All of these inspections were requested and paid for.

A few years ago there was antagonism in some quarters toward national standards for agricultural products, but that attitude has entirely disappeared. It is difficult to establish nomenclature to the satisfaction of all interests, but this is rapidly being accomplished and practically no one now objects to the idea of national standards for farm products.

Progress in Cast-Iron-Pipe Standardization[3]

AT A RECENT meeting of the Sectional Committee on the Standardization of Cast Iron Pipe the scope of the work of the four sub-committees of Technical Committee No. 1 on Dimensions was outlined as follows:

1-A, Dimensions of barrels of sand-cast pipe; 1-B, bell and spigot dimensions, lugs and harness; 1-C, all types of pipe except vertical sand-cast; 1-D, fittings for all types of cast-iron pipe.

Prof. M. I. Enger of the University of Illinois has been elected to the chairmanship of Technical Committee No. 2 (on Metallurgy, Processes, and Tests), succeeding H. E. Bates, who has resigned.

All sub-committees of Technical Committee No. 3 (on Corrosion and Protective Coatings) have been active. The sub-committee on Theory of Corrosion (3-A) has completed a bibliography on the corrosion of cast iron, and is laying out a program of research on the causes and correction of corrosion of cast-iron pipe.

Another sub-committee (3-B) is making similar studies of organic coatings, and it appears that marked improvement in product is possible at moderate cost, using existing information.

A third sub-committee (3-C) working on inorganic coatings, is studying the present commercial practice in cement coatings, at Birmingham, and plans an investigation of the optimum thickness for permanent protection, adhesion, handling, shipping, cutting, and tapping properties.

Sub-committee 3-E on soil corrosion has prepared a résumé of the present status of knowledge of the soil-corrosion problem, and plans to coördinate investigations of the cause and mechanism of soil corrosion.

Sub-committee 3-F on hydraulics plans to organize field tests of the carrying capacity of new and old cast-iron pipe with coal-tar-pitch coatings and with cement coatings.

The Sectional Committee has voted a resolution urging upon the Department of Commerce the continuation of the extensive soil-corrosion tests carried on by the Bureau of Standards.

Machine Tapers

DURING the past two months the Sub-Committee on the Standardization of Machine Tapers has sent out approximately

[1] From the Sustaining-Members Bulletin of the American Engineering Standards Committee, 29 West 39th Street, N. Y.

[2] Abstract of an address given by Lloyd S. Tenny, Chief of the Bureau of Agricultural Economics, before the Main Committee of the A.E.S.C. and reported in its Sustaining-Members Bulletin of October 31, 1927.

[3] From the Sustaining-Members Bulletin of the American Engineering Standards Committee, 29 West 39th Street, New York.

five hundred copies of a letter of inquiry concerning the project which has been assigned to it. A good response has been received, but the Committee would welcome further expressions of opinion on this subject from the readers of MECHANICAL ENGINEERING, especially since it plans to hold a meeting in New York during Annual Meeting week. The form letter which the Committee has used is reproduced below:

GENTLEMEN:

A study of the development of the three machine tapers now in general use in the machine shops of the United States and Europe is equivalent to a review of the history of machine tools. First in 1860 the Brown & Sharpe series appeared on the milling machines of that company: 1/2 in. to the foot (ratio 1:24). Two years later (1862) it was followed by the Morse taper on drill presses and twist drills; 5/8 in. to the foot (ratio 1:19.2). The same year William Sellers & Co. advocated a steeper taper of 3/4 in. to the foot (ratio 1:16) for use on lathes, boring mills, etc. Later in 1889 the Jarno was devised by Mr. O. J. Beale of the Brown & Sharpe Mfg. Co. The B. & S. "Magnum" machine tapers Nos. 19 to 26 now have a taper of 3/4 in. to the foot.

Owing to the limitation of early measuring methods these series of tapers became irregular. The steepness of the Morse series, however, made it more popular than the Brown & Sharpe series. The Jarno series, though defined by an easily recalled mathematical formula, has been found to produce tapers which are generally too long. The recent standardization of milling-machine spindles has reduced to some extent the importance of the Brown & Sharpe series.

With the history of machine tapers in mind Sub-Committee No. 3 on Machine Tapers is seriously considering the advisability of recommending the adoption of one taper as standard in the United States. Believing that this taper should be one of general utility and easily freed, it is considering 3/4 in. to the foot or 1:16. The members of the Sub-Committee are mindful of the present wide use of the Morse taper but, since the several units in this series vary from 0.5986 to 0.6315 in. to the foot, they feel that there is a question as to whether or not such a practice should be raised to the dignity of an American Standard.

Accordingly, to secure guidance in preparing its recommendations the following six questions are being asked of a limited number of the principal manufacturers and users of machine tools:

1 Do you approve of the adoption on *one* machine taper as standard?
2 If so, do you favor 3/4 in. to the foot?
3 Or, do you favor 6/10 or 5/8 in. to the foot?
4 Do you believe the adoption of *two* standards for machine tapers is necessary?
5 If so, do you favor 3/4 and 1/2 in. to the foot as these standards?
6 Will your company adopt the recommendations of the Sectional Committee as and when such a standard becomes desirable for new designs?
7 General remarks.

In considering your reply to these questions please be assured that should the one taper having a steepness of 3/4 in. to the foot be finally recommended by the Committee, abundant provision would be made for its gradual introduction into use.

Very truly yours,
(*Signed*) E. F. DUBRUL,
Chairman, Sub-Committee No. 3 on Machine Tapers.

Correspondence

CONTRIBUTIONS to the Correspondence Department of Mechanical Engineering are solicited. Contributions particularly welcomed are discussions of papers published in this Journal, brief articles of current interest to mechanical engineers, or comments from members of The American Society of Mechanical Engineers on activities or policies of the Society in Research and Standardization.

Concerning the DeHavilland Differential Aileron

TO THE EDITOR:

On page 1015 of the September issue of MECHANICAL ENGINEERING there appeared an article descriptive of the DeHavilland differential aileron, which opened with the words, "This device has been known since 1923."

In a moment of bitterness and self-justification, a Voice once said, "A prophet is not without honor, save in his own country." It is true that DeHavilland, since 1923, has received scant attention or credit for this aileron device from his own countrymen, and hat recently the aeronautic, automotive, popular scientific, and engineering press of this country has been giving him wide publicity and acclaim.

Rising now to my own defense—and incidentally to the defense of my own country, these United States of America, I am constrained to call your attention to the fact that the identical principle of aileron control and operation referred to was invented by me and covered by U. S. Patent No. 1,036,178, applied for Aug. 8, 1910, and issued Aug. 20, 1912. That is to say, 11 years prior to DeHavilland's reach of memory. (This invention was also patented in Great Britain at that time.)

The specification and claim of my patent, covering the particular feature in question, follows:

The differential operation of the ailerons consisting of relatively greater angular elevation than angular depression, causes relatively greater deflection of the elevated aileron than that of the depressed aileron. As the air beneath the aileron and the wings is always more compressed, or dense, than that above the wings and ailerons, such lower strata of air being cushioned or compressed, so to speak, by the weight and impact of the machine, it requires less downward inclination of each aileron than upward inclination of the opposite aileron to produce the same stabilizing tendency or effect. Thus the ailerons differentially actuated, respectively upward and downward, exert substantially equal stabilizing effects, transversely, upon the machine.

CLAIM NO. 9. In a flying machine, lateral stabilizing means, comprising members at opposite sides of the machine, cranks with which the members are respectively operatively connected, other cranks, links connecting the first-named cranks and the second-named cranks in pairs, and single pivotal means for actuating all of said cranks and links, and whereby the members are *moved oppositely through paths of predetermined unequal extent.*

It will be seen that whatever honor or merit this differential principle of aileron control wins, now or in the future, belongs rightfully to me and to the United States, and not to DeHavilland and Great Britain. And since it is the policy of MECHANICAL ENGINEERING to correctly inform its readers in matters of scientific conceptions and developments, it now owes said readers publication of the facts here submitted.

JOSEPH BLONDIN.

Los Angeles, Calif.

Wave Power

TO THE EDITOR:

The article on Wave Power by Lieutenant-Commander Smith in the September issue of MECHANICAL ENGINEERING is interesting, but the writer is sure the author will find that one great difficulty will be to get rid of the entrained air, which will be considerable in such turbulent water and which the air vent cannot reach.

An experience of the writer some years ago convinced him that a hydraulic ram would not pump air, and equally convincing was the fact that his assumption that water from an artesian well 600 ft. deep flowing about 6 ft. above the ground would be free of air, was wrong.

The project which provided this experience was that of using the 6-ft. head from this well to operate a hydraulic ram to raise part of the water to a tank about 30 ft. higher.

Conditions were such that the ram could be placed about two feet below the surface of the ground and still provide drainage for the waste water, which would give 8 ft. head in a vertical 6-in. drive pipe to the ram. The outfit was installed, the water turned on, and the ram commenced pumping water and continued to do so for about an hour, when the pumping stopped. Investigation showed that the body of the ram was filled with air. This was gotten rid of and the pumping started again, only to stop as before. The trouble was remedied by passing the discharge from the well into a small open tank, to the bottom of which the drive pipe was connected. The air escaped from the surface of the water in the tank, and there was no further trouble. How did the air get into the water?

Referring to Fig. 1 of the article in the September issue, the waste valve must discharge overboard. The waste water will not return to the drive pipe, and there must be a check valve in the discharge pipe.

ALONZO G. COLLINS.[1]

Philadelphia, Pa.

[1] Consulting Mechanical, Architectural, and Refrigerating Engineer.

The Conference Table

THIS Department is intended to afford individual members of the Society an opportunity to exchange experience and information with other members. It is to be understood, however, that questions which should properly be referred to a consulting engineer will not be handled in this department.

Inquiries will be welcomed at Society headquarters, where they will be referred to representatives of the various Professional Divisions of the Society for consideration. Replies are solicited from all members having experience with the questions indicated. Replies should be as brief as possible. Among those who have consented to assist in this work are the following:

ARCHIBALD BLACK,
Aeronautic Division
A. L. KIMBALL, JR.,
Applied Mechanics
H. W. BROOKS,
Fuels Division
R. L. DAUGHERTY,
Hydraulic Division
WM. W. MACON,
Iron and Steel
JAMES A. HALL,
Machine-Shop Practice Division
CHARLES W. BEESE,
Management Division
G. E. HAGEMANN,
Materials Handling Division
J. L. WALSH,
National Defense Division
L. H. MORRISON,
Oil and Gas Power Division
W. R. ECKERT,
Petroleum Division
F. M. GIBSON and W. M. KEENAN,
Power Division
WINFIELD S. HUSON,
Printing Machinery Division
MARION B. RICHARDSON,
Railroad Division
JAMES W. COX, JR.,
Textile Division
WM. BRAID WHITE,
Wood Industries Division

Applied Mechanics

Courses in Applied Mechanics

AM-1 Are advanced courses in applied mechanics, particularly in dynamics, needed?

Much traditional opposition exists relating to the introduction of theory into the college training of mechanical engineers, because it is assumed that the engineer does not need this knowledge in his every-day activity. Dynamics is therefore listed as an advanced course fit only for post-graduate work. However, industrial concerns find it advisable to go to the expense of training their young engineers in theoretical dynamics, the cost of such training being considerable when everything is taken into consideration. On the other hand, the writer had the opportunity to hear the opinion of the head of the mechanical department of a large university that this is just a fancy of these particular concerns. He advocated that industry, in general, does not require theoretical training beyond the present college standards. This viewpoint, it must be said, is not very complimentary to the great art of mechanical engineering.

Indeed, the last generation has brought forth a remarkable change in industrial tendencies, the chief object at present being economy of effort, elimination of waste, and improvement of processes. Competition is formidable, and the designer must be careful when making the customer pay for his experimenting on new developments. Moreover, the mechanical engineer at present deals mostly with the improvement of apparatus rather than with the creation of basically new devices, and this causes the development work to pass from the hands of the old-time inventor into those of the present-day trained engineer. The questions which confront the designer are commonly how to build apparatus with the least amount of material, and in the most economical way without passing the limits of safety. The answer cannot be found without analyzing the forces inherent and acting in the machine. It must be observed, however, that the existing courses in mechanics do not provide the means for analyzing the dynamical forces which play such an important role in the present-day high-speed machinery.

Speeds of rotation are used now which were unheard of a generation ago. High-speed tool steel and the introduction of grinding have allowed the speed of machine tools to be raised. Gas engines run at several thousand revolutions per minute, elevators work at dangerous accelerations, and other instances could be given in abundance where the dynamics of mechanisms must be considered if a reasonable design is to be made.

The vibration question became of supreme importance, and elimination of vibration confronts the mechanical engineer every day; but the regular course in mechanics does not discuss vibration. Only a few graduate mechanical engineers could explain how the spring counterweight acts in the "Buick" they drive, or how a crankshaft is balanced.

No doubt whatsoever is entertained of the necessity of an electrical engineer being well acquainted with the theory of electrical phenomena, and this is taught in schools in more or less elementary form. Students of mechanical engineering who later will be compelled to handle dynamical problems should be given an equivalent understanding of the fundamentals of dynamics.

Signs of growth of interest in this condition are in evidence in colleges. The meetings of professors of mechanics during last summer at Cornell University and the University of Wisconsin, proved that the colleges are giving thought to developing a more extensive course in mechanics.

The ideal state would be that every graduate mechanical engineer be trained to comprehend the kinematical and dynamical problems which he will inevitably meet in his engineering career. It is almost certain that at least those who expect to engage in design and development work will, in the near future, be given an opportunity to prepare for their activities by a course in dynamics going beyond the meager elements taught at present.

The danger exists, however, of going to the other extreme of giving the students too advanced a course in mechanics, following one of the good but very theoretical books on mechanics, and of treating the subject from too purely a scientific standpoint. It is quite probable that professors of mathematics will be put in charge of this course and that the mathematical side of the subject will be stressed. The derivations of the laws will be explained with exactness, but the future engineers will not profit much by such a course in dynamics.

This course should be composed only of matter which can be immediately applied to the solution of practical problems, the presentation of the course being rather elementary. Fundamentals should be emphasized and illustrated by application to practical problems which can easily be obtained from the industries. Kinematical problems would be easier to comprehend if graphically treated, and methods of simplifying problems should be taught, to lessen the work when analyzing dynamical systems.

It is quite natural to expect that in response to the request of industries, a standard course in dynamics will gradually be worked out in a manner analogous to the definite standardization of the course in statics and elements of dynamics which is offered at present. This, however, will take time. Meantime it seems advisable to add to the existing courses of mechanics a course which will treat the dynamical problems most often met by a mechanical engineer in his work, and which will give all fundamentals necessary for their solution. A tentative program of such a course follows:

1 Principle of virtual displacement as a tool to solve statical problems, especially when the forces acting in a system of several members are to be found
2 Application to moving kinematical systems. Connection between statical and dynamical problems. Forces in elements of moving mechanisms
3 Paths of points, velocities, and accelerations in link mechanisms, graphical method
4 Simple vibration problems, balancing rotary and reciprocal engines, elimination of vibrations

5 Rotation of rigid bodies. Gyroscopic effect and forces. Practical applications
6 Governing of machines. Theory of governing. Types of governors
7 Impact. Instantaneous stresses.

The American Society of Mechanical Engineers has already recognized the importance of the promotion of applied mechanics by creating a corresponding new Professional Division. A still stronger impetus would be given to the introduction of more extended dynamics courses in the colleges, should the Society make recommendations to this effect. (G. B. Karelitz, Research Department, Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa.)

Iron and Steel

Economic Operation of Sheet-Rolling Mill

IS-1 In an article on the continuous rolling of sheet steel appearing in the May, 1927, issue of MECHANICAL ENGINEERING, the statement is made that a continous sheet mill can be operated economically only in connection with a steel plant. An explanation of the reason for this is solicited.

The main reason for this is that an ingot to be suitable for continuous sheet rolling has not only to be of a somewhat unusual size and shape, but, what is more important, in its manufacture certain precautions have to be observed which are not required in making other kinds of steel. Thus, it is very important to keep the composition of the steel within usual strict limits, which means that it is not desirable as a rule to use hot metal. The scrap used has to be very carefully graded and known as to origin. Precautions have to be used to employ a low-sulphur fuel, etc. An outside plant will either not be willing to take such extreme care or will charge so much for doing it as to render the operation commercially unprofitable. (L. C., New York, N. Y.)

Railroad

Grinding Wheels for Finishing Locomotive Parts

R-14 What kind of grinding stones should be used for finishing piston rods, valve stems, crank pins, and axle journals? Does the kind of steel from which these locomotive parts are made make any difference in the selection of the grinding stone?

(*a*) The shops of the Baldwin Co. advise that grinding wheels (not stones) are used for this purpose, and that these are made of different grits to suit the metals to be ground—whether hard or soft—the grits in grain form varying from 100 to 16 mesh, and also varying in hardness according to the purpose for which the grinding wheels are to be used. In this operation the speed of the wheels and the amount of feed also enter into the problem of production and finish. (R. S. McConnell, Chief Consulting Engineer, Engineering Department, Baldwin Locomotive Works, Philadelphia, Pa.)

(*b*) In connection with Norton cylindrical wheels, grain 46 grade K can be used successfully in the grinding of all of the parts mentioned in this question. Slight differences in the wheels can be offset through a change in the work speed. If steels radically different from those customarily used for any of these parts are introduced, it may be necessary to experiment a bit with grinding wheels before selection is made. (Wm. D. Bennett, Sales Engineering Department, Norton Co., Worcester, Mass.)

Back Pressure in Locomotive Cylinders[1]

R-15 What has been done to reduce or eliminate back pressure in the cylinders of a locomotive? It is understood that back pressure is one of the prime reasons for the relatively low efficiency of the steam locomotive. The back-pressure problem has been solved in power-plant operation, why can't it be done on the steam locomotive?

Referring to this subject as discussed in the October, 1927, issue of MECHANICAL ENGINEERING, and particularly to the reply of Mr. Edw. N. Trump, who states that there is back pressure in locomotive cylinders of from 15 to 30 lb. per sq. in., it should be pointed out that from recent tests made on one of the principal eastern railroads it has been found possible to operate heavy passenger locomotives carrying boiler pressures of 200 lb. per sq. in. so that the back pressure ranges from 7 lb. maximum down to as low as 2 or 3 lb. above atmospheric. In freight service, back pressures ranging from 8 to 12 lb. have been found to be entirely practical, and locomotives operating in revenue service are giving satisfactory results with back pressures held within the limits above mentioned. The above results are obtained on two-cylinder engines equipped with feedwater heaters, which assist to some extent in reducing the back pressure. The only additional equipment required is a gage to indicate back pressure so that the reverse lever may be adjusted accordingly. Your correspondent is also referred to recent issues of *Railway Age* describing the application of forced draft to locomotives of the Texas and Pacific Railroad, permitting the use of large-diameter smoke stacks and eliminating the draft nozzle which is largely responsible for the back pressure. (H. W. Fitch, Assistant Engineer, The N. Y. N. H. & H. R. R. Co., New Haven, Conn.).

[1] This subject has been discussed in a previous issue.

Miscellaneous

Curing Porosity of Aluminum Castings

M-13 What methods are available to cure porosity in aluminum castings?

There are three methods of curing porosity in aluminum castings. The first one, about which the least is known and which is employed to handle a large number of very small cavities in a casting that will not have to be exposed to elevated temperatures (elevated for aluminum, of course), consists in artificially producing oxidation in the body of the casting. As aluminum oxide is a good deal bulkier than aluminum metal, the cavity is closed up in a manner that will withstand quite considerable pressures. The other two methods are welding and casting. The former may be employed to close up cracks, local porosity, draws, holes and the like, and may be applied even to the salvage of castings which contain large and serious defects such as long cracks. Soldering is admissible only where the defect is small and occurs in a part of the casting which will not be exposed to such stresses that the failure of the part might lead to serious loss of property or danger to people. It is, however, extensively used to repair comparatively harmless defects, where the main purpose is improvement of appearance of the finished casting. (L. C., New York, N. Y.)

Questions to Which Answers Are Solicited

Drawing-Room Light Exposure

M-14 What have been the observations of readers regarding the effect on draftsmen of light in the drawing room, that is, the direction of exposure of windows?

Symbolization of Standards

M-15 The subject of symbolization of standards on a national basis, although of primary interest to mechanical engineers, has never been discussed in this country; apparently, for lack of interest. Comments from readers should prove of value.

Materials Handling

Pulsation of Chain Conveyor

MH-1 In slow-moving chain conveyors operating at rates as low or even less than one foot per minute there is often present a decided pulsation or jerking of the chain. At times, however, operation is smooth. Can any of the readers suggest a solution of this problem or mention a possible cause of the difficulty?

Power

Cylinder Jackets for Uniflow Steam Engines

P-5 Should a uniflow-steam-engine cylinder be provided with steam-jacketed heads only, or with steam-jacketed heads and steam jacket extending part of the length of the cylinder? Why should not the steam jacket extend the full length of the cylinder?

MECHANICAL ENGINEERING

A Monthly Journal Containing a Review of Progress and Attainments in Mechanical Engineering and Related Fields, The Engineering Index (of current engineering literature), together with a Summary of the Activities, Papers and Proceedings of

The American Society of Mechanical Engineers

29 West 39th Street, New York

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BY-LAW: The Society shall not be responsible for statements or opinions advanced in papers or.....printed in its publications (B2, Par. 3).

The Year's Progress in Mechanical Engineering

ADVANCES in engineering are rapid and at times disconcerting. An analysis of recent progress as a basis for future planning is an essential for constant improvement. The reporting of progress is therefore an important function, and the Professional Divisions are performing a valuable service in preparing and publishing of progress reports—one of their four newest activities.

This is the third year that such progress reports have been published, and they now form an important part of the year's literature. The reports for 1927 will be presented at the Annual Meeting sessions of the various divisions, and should furnish the basis for a deal of interesting discussion. The January issue of MECHANICAL ENGINEERING will contain all of them, and the individual reports will also appear in the quarterlies devoted to the Divisions which prepared them.

The New A.S.M.E. Publication Policy

THE new procedure for issuing the Society's publications will be inaugurated in 1928. The most important innovation will be the series of quarterly editions of Transactions for each of the Professional Divisions which have sufficient material to make such quarterly editions worth while. These quarterlies will appear shortly after the first of the year. The first ones to make their appearance will be those on Aeronautics, Machine Shop Practice, Fuels, and Power.

Each member of the Society will receive an annual volume known as the Record and Index. This volume will contain an index of the technical papers and reports which have been issued by the Society during the year, and information as to where and in what form these papers and reports may be obtained.

MECHANICAL ENGINEERING will bring to each member the papers that are of general interest to the entire membership, as well as brief abstracts of the papers that are to appear in quarterly form. By consulting MECHANICAL ENGINEERING, therefore, each member may learn what papers are to appear in the quarterlies of the Divisions. An order blank will be provided so that members may secure copies of the papers desired in addition to those in the quarterlies which they will receive as members of the Divisions in which they register.

MECHANICAL ENGINEERING and the Record and Index will therefore furnish complete information by means of which every member may keep in intimate touch with the technical output of the Society.

The Expanded Engineering Index Service

A COMPREHENSIVE scheme for indexing the engineering literature of the world is to be initiated the first of the year, with the new weekly Engineering Index Service of the A.S.M.E.

This task is to include the preparation of index items for the 1500 technical publications of the world appearing in 17 languages in 37 countries which are received in the Engineering Societies Library. The index items will be printed on cards and mailed weekly to the subscribers to the new service. This project was authorized by the A.S.M.E. Council as an important extension of the Engineering Index in its service to research and the development of industry, and to bring to every one not only in the United States but in any country the wealth of information appearing in the current technical literature of the world.

The A.S.M.E. has published the Engineering Index since 1919, when it was taken over from the *Engineering Magazine.* During the eight years this book has been published by the Society, its volume of material has increased from approximately 8000 items annually to 16,000. These were first published monthly in MECHANICAL ENGINEERING, and at the end of the year collated in an annual volume. With a book of this kind it is possible to give only an incomplete service, while the modern needs of industry demand complete information about published technical material throughout the world and require it promptly. Accordingly, the new scheme was developed to meet this demand.

This service is made possible by the splendid coöperation of the Library Board of the United Engineering Society Library.

The new service will be under the general supervision of the Committee on Publications of the Society, of which Ralph E. Flanders is chairman, and the Finance Committee, under the chairmanship of H. V. Coes. Carlos de Zafra occupies the post of Director of the Engineering Index.

An Engineering Thrill

ALTHOUGH we live in an age of marvelous engineering feats, it is not often that the work of the engineer can be considered thrilling—it is more likely to prove awe-inspiring. Still more rare is the achievement that awes the observer, yet thrills him. A notable example is the Holland Tunnel, opened to the public on November 12, 1927.

Confront the average individual with the figures of construction and he blinks his eyes in bewilderment. To visualize the task of removing 500,000 cubic yards of material from a 9250-foot tube, 5480 feet of that under the bed of a river, then wall that up with 115,000 tons of cast-iron plates, instal a ventilation system to supply 3,761,000 cubic feet of fresh air per minute, equip that tube with a signal system, fire lines, and telephones, and police it so that 2200 cars per hour may safely pass, is next to impossible, and the man of the street with little knowledge of engineering is awed, to say the least.

There are a few things that he does know, however. He knows traffic jams, fires, crumpled fenders, dark subway tunnels, the tendency of a river bed to be very wet, and the fact that gasoline motors exhaust fumes that choke and kill if they become too dense.

Imagine, then, his mental reactions at first sight of the beautiful white terra cotta walls of the finished tube; the brilliantly lighted roadway, perfectly dry and clean; the numerous traffic signals and officers to man them; doors labeled "fire hose" and "fire extinguisher" at frequent intervals; plenty of space between cars; a white line over which passing to the right or left is prohibited; and, most important, the confidence-inspiring roar of the fresh invigorating air as it rushes in through the slots near the roadway and passes out through the ceiling vents, leaving not a trace of smoke. Small wonder that the thousands of cars passing through on the opening day bowled along with their horns and sirens going full blast, many of them falling in line again to make a second and third trip. What a pity the ears of Clifford M. Holland were forever stopped to this spontaneous tribute to his genius.

The I.E.C. Meets in Italy

TWENTY-ONE separate countries were represented by the 250 delegates who attended the meeting of the International Electrotechnical Commission held at Bellagio, on Lake Como, Italy, September 4 to 12. Among these delegates were 21 from the United States. The meeting was opened by the usual formal addresses, this time by President Guido Semenza, Prof. L. Lombardi, president of the Italian Committee, the mayor of Bellagio, and representatives of two Italian ministries.

The program called for meetings of 13 of the Advisory Committees of the Commission. For three of these—Prime Movers, the Rating of Rivers, and Nomenclature—the United States holds the secretariat. Dr. William F. Durand, Past-President A.S.M.E., was requested to preside over the eight sessions held by the Advisory Committee on Prime Movers and the two sessions of the Advisory Committee on Rating of Rivers. Dr. C. O. Mailloux, director of the secretariat for Nomenclature, was extended the courtesies of the chair for the four sessions of Nomenclature. In addition to these, Dr. C. H. Sharp, chairman of the U. S. National Committee of the I.E.C. and C. E. Skinner, chairman of the American Engineering Standards Committee, also of the American Delegation, were designated as chairmen of Advisory Committee sessions.

As we go to press only partial records giving the results of the technical sessions are available, but these indicate that the meeting was a successful one. The preliminary reports of the Advisory Committees were transmitted to the Committee of Action, and were finally passed upon by the Plenary Meeting of the I.E.C. which was held in Rome on September 22. Prof. C. Feldmann of Delft, Holland, was elected to succeed Dr. Semenza as president of the Commission, and Lt-Col. K. Edgcumbe is to succeed Sir Richard Glazebrook as honorary secretary.

The usual banquet was held on September 10, at which the Americans presented a bust of Benjamin Franklin to the Italian National Committee.

Following the close of the technical sessions, the delegates and their friends were conducted on a twelve-day sightseeing trip planned by the Italian National Committee. This included visits around Lake Como, Venice, Florence, and Rome.

Third International Conference of Scientific Management

THE Third International Conference of Scientific Management was held in Rome, Italy, September 5 to 9, 1927. The opening ceremony took place in the Senate Chamber of the Capitol, which was completely filled, with many standing against the walls throughout the session.

Senator Luigi Luiggi, president of the Congress, and an imposing array of high officials were present to welcome the delegates in the name of His Majesty, the King. Senator Belluzzo, Minister of National Economy delivered the opening address, speaking in Italian on behalf of the Governor of Rome who was unavoidably absent.

He was followed by Senator Luiggi, who extended a welcome in Italian, French, Spanish, German, and English. Speaking in this session also was Prof. Francesco Mauro, president of the International Committee on Scientific Management at Geneva and of the Italian Committee, who, it will be remembered, visited this country during the summer in the interest of scientific management. Professor Mauro dwelt upon the matter of standardization and the elimination of waste, and of the necessity of persuading both employer and employee to unite in a common effort to accomplish this end.

The work of the Congress was divided into four sections: (*a*) Industrial; (*b*) Agriculture; (*c*) Public Services; and (*d*) Domestic Economy. John R. Freeman, Past-President of the A.S.M.E., acted as chairman of the Industrial Section.

The second and third days of the meeting were devoted to the presentation in abstract of as many of the 150 papers as practicable. Difficulty was experienced in the execution of this huge task, owing to the delay in the distribution of papers. Otherwise the organization worked admirably, and the Italian Committee is to be congratulated upon the excellent arrangements for the housing and entertainment of the large gathering, number about 1200, of forty-two nationalities. The list comprised professional and industrial groups as well as members of the families of the delegates.

Among the American contributors of papers present were Wilfred Lewis, Dr. John H. Gray, William H. Leffingwell, Henry S. Dennison, Wallace Clark, L. J. O'Rourke, John R. Freeman, and Gen. William Crozier.

Among the papers presented in the Industrial Section was one by L. Urwich, of London, describing management research groups in Great Britain. F. W. Lawe, secretary of the National Institute of Industrial Psychology, of London, traced the development of industrial psychology in Great Britain. Further evidence in favor of the scientific selection of workers was brought out by Dr. Paul Sollier and José Drabs, of Brussels.

Otto S. Beyer, Jr., of Washington, D. C., contended that the next important step in the organization of industry must lie in the development of coöperation between trade unions and management.

Other contributors were P. J. Ermanski, of Moscow, who said that the Russian tendency was to oppose mass production; Morton C. Tuttle, of Boston, Mass., describing the organization and management of a moderate-sized engineering construction company; and F. Hawsby, describing methods used in a British factory at York with trade-union coöperation.

The fourth day was devoted to the closing ceremonies made memorable by the presence of His Excellency, Benito Mussolini. Signor Mussolini has manifested the greatest interest in scientific management in Italy, where its practical application is no novelty. All of the activities in this country were recently grouped and given a considerable impetus by a central body, the Ente Nazionale Italiano l'Organizzazione Scientifica del Lavoro. This body has the support of the Government as well as that of the employers' associations.

Hydraulic Lessons Learned Abroad

AMERICA lags behind in flood prevention. As a result the Mississippi floods and the more recent flooding of the Connecticut Valley in New England have caused us the loss of hundreds of lives and an enormous financial loss. A careful investigation of European methods has convinced the Travelers of the Freeman Fellowship that such loss was largely avoidable. To them it seems evident that a more efficient study of hydraulics along the lines that have been adopted in Europe, would have minimized these calamities.

This group of Traveling Fellows consists of H. N. Eaton, formerly of the Aeronautics Instrument Department of the U. S. Bureau of Standards, who is already familiar with the use of models in wind tunnels; Prof. B. R. Van Leer, of the Mechanical Engineering Department of the University of California; M. P. O'Brien, Instructor of Hydraulics at Purdue University; K. C. Reynolds, Instructor of Hydraulics at Massachusetts Institute of Technology; Dr. L. G. Straub and F. T. Mavis, recent post-graduate students of the University of Illinois; J. B. Drisko, of Massachusetts Institute of Technology. They represent the A.S.M.E., the A.S.C.E., the Bureau of Standards, the Boston Society of Civil Engineers, and the German-American Student Exchange, and since September of this year have been studying hydraulics in Europe on a tour that will last a year.

Everywhere they found the same principle of exhaustive research and laboratory test before any actual hydraulic work was undertaken. Particularly was this true in Sweden, where the great Hydraulic Laboratory of the Technical University of Stockholm furnishes a striking example.

The reports received from various members of the group emphasize the almost universal belief among European hydraulic engineers that the wisest method of hydraulic construction is to make a thorough test by building and testing a model of the proposed work before adopting the final design and starting construction. The investigations cited give strong proof that the plan pays. In actual practice it has apparently reduced the cost of construction and avoided enormous losses through defective designs.

At the Kristineham "Verkstaden," the report shows that for every turbine designed two models are tested before it is actually

constructed. This method has been applied in developing the Kaplan turbine, which is a high-speed, low-head machine giving over 93 per cent efficiency on extremely low heads. The reports treat of investigations in many places, but the University of Stockholm has carried this idea out most thoroughly. The investigations here have revealed exceptionally valuable information, and have ranged from the study of the pressure of ice against dams and the flow of water in sand to a comprehensive study of the proposed Chendoroh Dam in India.

By this method the actual result is arrived at through the construction of miniature models where the action of the water can be seen and studied. Every element entering into the problem is carefully reproduced in proportionate scale. Thus enormous sums have been saved. Tested by the real American criterion, it is well worth while—it has paid for itself in the savings effected and to be effected.

Some particularly valuable investigations are discussed in the reports that clearly demonstrate the effectiveness of the method and its final economy. In the Hammersfarsen Dam in Northern Sweden, the problem presented to the laboratory was to determine the most effective means of discharging logs over a dam at the lowest construction cost. A design had been prepared, but the tests by the use of a model showed that the logs would have jammed at the boom protecting the inlet to the plant. Two other arrangements were tried, but it was found that with a side wind the logs would still jam. The fourth and accepted arrangement showed that the logs would not jam under any wind conditions. The dam is now being constructed according to the design worked out in the laboratory. The model cost is about $750. The engineers estimate that the saving through the elimination of a large part of the original design was about $100,000—a very material saving to secure.

Ireland has profited too. In the Bann River Project it was found necessary to develop some effective means of preventing erosion at the foot of the spillway. This problem was taken up in the laboratory by Mr. Erik Linquist. He used his nappe-cutting energy dissipaters, which partially destroy the energy of the falling sheet of water and cause the hydraulic jump to occur at the end of the overfall. The development of this method required but 20 hours of work and resulted in the complete abandonment of the original designs and the use of the information obtained from the model tests.

The Chendoroh Dam to be built in India presented various problems and several models were used. The spillway section and apron were studied in glass-sided channels to scales of 1:36 and 1:52. The dam is to be of the Ambursen or hollow reinforced-concrete type in which water fills a part of the hollow interior. It was found that waves of serious proportions were liable to occur in this water; but by means of the model studies suitable bottom outlets and interior diaphragms were designed. A design was developed for the toe of the apron which would not cause scouring, and erosion was prevented by extending the side walls of the spillway along the apron.

As pointed out in the report, this particular study impresses one as to the possibilities of a study of a Mississippi River spillway. The completed dam, to a scale of 1:96, was 1.5 ft. wide and 20 ft. long and the flow shown corresponding to a discharge of 25,500 second-feet. The maximum discharge of the actual dam will be about 350,000 second-feet, yet the conditions of flow were studied quite satisfactorily by means of models. This flow is comparable to discharges expected over the Mississippi River spillways, so there is every reason to believe that the spillways problem of the Father of Waters could be satisfactorily studied by means of models.

At the Sikfors plant dangerous erosion had taken place at a bridge pier below the apron of the dam and it was thought that the pier would fail in the spring of 1927. Accordingly methods of preventing further erosion were studied in the laboratory. After several suggestions of the designing engineers had been tried, a successful method was found. The total cost of the model in this case was about $750; the labor costs amounted to an additional $500. As estimated, the total cost of repairs and additions to the full-sized structure will amount to about $100,000, but these repairs and additions are expected to save the pier and obviate the construction of a new bridge which would cost many times the sum mentioned. Altogether the reports so far received seem to indicate the wisdom of adopting a similar plan here in America.

A War Memorial for American Engineers

APPROXIMATELY eighty members of the Founder Societies died in service overseas during the World War. No memorial to these engineers has been set up. A unique and fitting possibility was discovered during the summer.

While Dr. Edward Dean Adams, Fellow, American Society of Civil Engineers, and Associate, American Institute of Electrical Engineers, was in Belgium last June as delegate of the Founder Societies, Engineering Foundation, and the Engineering Societies Library, to the celebration of the five-hundredth anniversary of the University of Louvain, he learned that the new Louvain Library building being given by Americans lacked two important features: a clock, and a carillon for its tower. No Belgian tower is complete without them. For centuries the bells of the "singing towers" of the "Low Countries" have inspired, entertained, and educated the people. America's beautiful gift must be complete when dedicated next May or June.

Dr. Adams at once saw the opportunity for a peculiarly acceptable expression of good will from American engineers to their Belgian friends, and for a beautiful, perpetual memorial to American engineers who had given their lives outside their country in the great war. He secured the privilege of providing the clock and the carillon as gifts from American engineering societies. The time is short, but sufficient for prompt action. Approval of the project has been given by the Joint Conference Committee, composed of the presidents and the secretaries of the Founder Societies. A fund of $80,000 is needed. This will provide a clock with four faces, a three-octave carillon of thirty-six bells, installed and guaranteed for ten-ears, and an ample endowment for perpetual operation and maintenance.

The tower is square, and the four clock faces will typify the four Founder Societies. Each society may place on an inside wall of the tower a tablet to the engineers of its branch of the profession who made the supreme sacrifice.

An opportunity is now offered to each member of these societies and to the families and friends of the deceased engineers to contribute to this joint fund by sending checks, drafts, or money orders payable to the United Engineering Society, at 29 West 39th Street, New York, *before February 1, 1928*. Contributions of five dollars or more, or any sums which donors feel able to give, will be acceptable. Expenses are being separately provided for, so that every dollar given will go into the memorial. The names of all subscribers, without mention of amounts given, will be recorded in a beautiful memorial volume to be deposited in the Louvain Library. A copy of this book will be placed in the office of each Society.

Names of the American engineers to be memorialized, so far as they can be learned, will be inscribed on suitable tablets to be placed in the Library tower. The Committee desires to obtain the names and records of all American engineers who died outside of America in any branch of service of their own country or any of its allies, during the World War from its beginning in 1914. Names and records of such engineers are requested.

Here is both privilege and patriotic obligation fortunately reserved for American engineers to place the crown upon a beautiful permanent contribution to European higher learning, including the engineering and scientific branches. The project has grown out of the greatest relief enterprise connected with the war, organized and administered under the masterful leadership of American engineers. It is fitting that American engineers should put the finishing touches to this gift of peace. The project has been well received and its success is assured.

COMMITTEE ON WAR MEMORIAL TO AMERICAN ENGINEERS

GEORGE W. FULLER, representing the Civil Engineers
ARTHUR S. DWIGHT, representing the Mining Engineers
CHARLES M. SCHWAB, representing the Mechanical Engineers
ARTHUR W. BREESFORD, representing the Electrical Engineers
GEORGE GIBBS, representing United Engineering Society
EDWARD DEAN ADAMS, representing Engineering Foundation, *Chairman*

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Management Division Stages Successful Meeting in Rochester

Drawing representative engineers, managers, and executives from as far west as Colorado and as far south as Virginia, the two-day conference on management, held in Rochester, N. Y., under the auspices of the Management Division of the A.S.M.E., October 26 and 27, 1927, served as a focal point of the many meetings held during Management Week, October 24 to 29, throughout the country. Much of the success of the meeting may be credited to the Rochester Engineering Society, the American Management Association, and the Rochester Industrial Management Council.

Technical Sessions

All sessions were held in the Sagamore Hotel where registration headquarters had been established.

The opening session convened at 9:30 on the morning of Wednesday, October 26, with W. Roy McCanne in the chair. The subject for discussion, Coördinating Wage Incentives and Production Control, was treated by three authorities. The first, Oscar Grothe, discussed the use of the Bedaux Unit Measure of Man Power for the measurement of machine-hours, and of bench and storage space containers, etc. required for a given production. The second discussion, offered by D. B. Charters, gave a short account of the various methods that had been tried in the East Pittsburgh Works of the Westinghouse Electric and Manufacturing Company, together with a description of the plan finally adopted. F. B. Calhoun, the third speaker, brought out the difficulties of installing and operating incentives such as the protection of quality, and showed the effects of incentives, scheduling, and other phases of the production-control problem.

The discussion, both written and oral, which followed added greatly to the value of the session. Unfortunately, however, space does not permit a review of any of the discussion at this time, but a fairly complete account will appear in the publications of the Society at a later date.

G. S. Radford presided at the afternoon session, which was called to order at 2:00 o'clock. The subject allotted to this period was Coördinating Quality Control and Production Control, with papers by J. H. Marks, W. W. Graeper, and W. K. McAfee.

Mr. Marks pointed out that the most important factor in the accomplishment of a high standard of quality was the education of the entire manufacturing personnel to the standards desired. Mr. Graeper discussed the problem from the standpoint of a large manufacturer of optical instruments and accessories, while the manner in which it affected the ceramics industry was treated in Mr. McAfee's paper

Thursday morning's session convened at 9:30 o'clock, with M. Herbert Eisenhart in the chair.

Three papers were presented at this session. The first, How to Determine Expenditures in Material-Handling Equipment, by George E. Hagemann, contained a statement of the principles involved in the problem of economically selecting and using material-handling equipment. F. E. Raymond, under the title of How to Determine Economic Lot Sizes, discussed the derivation of formulas for determining quantity which can be produced at the lowest total unit cost, The final paper in the session dealt with Determination of Minimum-Cost Purchase Quantities, and was presented by Prof. R. C. Davis.

The afternoon session at 2:00 o'clock was presided over by Charles L. Cadle. In the first paper, Factors to Be Considered in Plant Location were treated by Tyler S. Rogers. This paper appeared in full in the November, 1927, issue of Mechanical Engineering, page 1191. Two contributions on an example of Plant-Location Study were presented by Emmett B. Carter and Charles P. Wood. The session closed with a discussion on Locating Plants in Foreign Countries, by Edward G. Miner.

Non-Technical Events

The most attractive of the entertainment features of the meeting was the dinner on Wednesday evening. The chief address was delivered by Gano Dunn, who discussed Management's Part in Maintaining Prosperity. The evening's program was in charge of the Rochester Management Week Committee.

Inspection tours of the Eastman Kodak Company, the North East Electric Co., the Stromberg-Carlson Mfg. Co., the General Railway Signal Co., the Taylor Instrument Company, the Bausch and Lomb Optical Company, and the Gleason Works proved interesting and instructive.

Wood Industries Division Holds Second National Meeting in Grand Rapids

Following the granting of the privilege of holding national meetings to Professional Divisions, the Wood Industries Division was the first to have its own convention. This was held in November of last year in Chicago, and the attendance was so encouraging that it was apparent at once that the move was a wise one.

A Second National Meeting of this Division was held October 18 to 19, 1927, in Grand Rapids, Mich. Sessions were held Monday afternoon and evening and Tuesday morning. In addition, plant inspection tours formed a part of the program.

Technical Sessions

R. K. Merrill opened the first technical session at 2 p.m. Monday. The first paper of the session was Problems of Design for Mass Production in the Furniture Industry by Bayard Richardson, in which specific problems involved in the mass production of an office desk were dealt with. Charles B. Norris, with his contribution on An Investigation of Some Stresses Acting on Bus Bodies, followed. Mr. Norris gave the results of tests made on bus bodies in an attempt to apply mathematics to bus-body design with the idea of deriving some general rules of design. R. K. Merrill and G. H. Roderick collaborated in a paper on Some Improvements in Handling Methods in Wood-Working Industries. Their paper covered recent installations of handling equipment.

At 7 p.m. William Braid White presided at an informal dinner session at which were presented papers on Lumber Standardization—Its Relation to the Wood Industry by John W. Blodgett, and The Need of Research on Tropical Timber Before Marketing It, by Arthur Koehler. Mr. Koehler's paper discussed the need for scientific research on tropical woods instead of the so-called trial-and-error method. He outlined the properties the research should determine, and what experiments should be tried to overcome objectionable features.

At this meeting a resolution was passed urging an energetic program of Federal reforestation and favoring conservation of available timber supplies that can meet our industrial requirements until such time as reforestation bring back to the country its heritage of timber.

Tuesday morning's session convened at 9:30 o'clock. First on the program was A. H. Stein with a paper on Compressive Tests on Balsa Wood, with special reference to the value of the material as an absorbent of machinery vibrations. M. S. Van Dusen gave results of tests by the Bureau of Standards on heat conductivity and structural strength of balsa wood in his contribution on Some Physical Properties of Balsa Wood.

A very important subject was treated by Paul S. Kennedy in A Study and Classification of Fiber Failures and Possibility of Satisfactory Wood Finish with Lacquer-Type Material. Film failure in wood and the absolute similarity of failures in lacquer and varnish were classified and explained. The development of a quick-drying lacquer base material to withstand outside exposure on wood and to resist humidity swelling of inside wood were discussed.

Committee Meetings and Plant Visits

In addition to the technical sessions two committees held special meetings. The Special Research Committee on Saws and Knives met at 10 o'clock Monday morning, and on Tuesday at 1:00 p.m. a luncheon meeting of the Special Research Committee on Tropical Hardwoods was held.

The program of the meeting was so planned that engineers arriving before noon could take in most of the special events such as plant inspection, etc. Several of the furniture plants in Grand Rapids were opened for inspection, and the visiting engineers made the most of the opportunity offered.

A.S.M.E. Iron and Steel Division Meets in Youngstown

THE activities of the recently established Iron and Steel Division of The American Society of Mechanical Engineers were inaugurated by a large meeting at the Hotel Ohio, Youngstown, Ohio, on Nov. 10, 1927. Youngstown was chosen because, in addition to rapidly becoming an important center in steel making proper, it is also attracting to within its district a number of large users of steel, and is therefore acquiring a growing importance for mechanical as well as metallurgical activities.

Much of the credit for the success of the meeting is due to the active coöperation of the following local engineering societies: the Buffalo Engineering Society, The Cleveland Engineering Society, The Engineers' Society of Western Pennsylvania, Lehigh Valley Engineers' Club, and the Technical Federation of Erie, as well as the Akron, Buffalo, Birmingham, Chicago, Cleveland, Columbus, Detroit, Erie, Lehigh, Philadelphia, Pittsburgh, and Toledo local sections of the A.S.M.E. Through the activities of these groups attendance at the meeting was secured from a wide area rather than from purely local sources.

The meeting comprised a technical service and an evening banquet, in addition to which a series of excursions were arranged. In the morning two papers were presented—one on the Four-High Continuous Wide Strip Mill, by F. C. Biggert, Jr. (Mem. A.S.M.E.), president of the United Engineering and Foundry Co., Pittsburgh, Pa., and the other by C. M. Phelps, director of Research and Test, Refractory Fellowship, Mellon Inst. of Industrial Research, University of Pittsburgh, on Super Refractories. These two papers and some of the discussion will be published in an early issue of MECHANICAL ENGINEERING. In the afternoon visits were arranged to the Campbell Works of the Youngstown Sheet & Tube Co., the Hazelton and Bessemer Works of the Republic Iron and Steel Co., Ohio Works of the Carnegie Steel Co., Truscon Steel Co., and the General Fireproofing Co. Because of the limited space available at the Hotel Ohio, only a part of the large number that applied for banquet tickets could be accommodated.

Technical Discussions

Both the discussions of the technical papers and the addresses at the dinner attracted attention not only of those present but of wide outside circles. In the discussion of Mr. Biggert's paper R. J. Wean, vice-president of the Aetna Standard Engineering Co., called attention to the commercial relation between the wide strip and the non-continuous sheet mill.

"There is no question," said Mr. Wean, "that steel in long lengths and in widths up to 42 in. can be rolled on hot mills of this kind. But when this product has been produced, it still remains in the form of hot strip steel. It is necessary to subject this to various finishing processes to impart the finish and physical properties required by the uses to which sheet steel is put. As these uses differ widely and are numerous, the sheet-steel industry is an industry of specialists.

"Installation and operation of continuous four-high mills has affected the sheet-steel market to such an extent that selling prices are much lower than they should be for either the sheet-steel producer or wide-strip steel. They have been competing in the same market, whereas it appears that they might serve each other to supply the same market on a non-competitive basis.

"Would it not be better for the producer of wide-strip steel to furnish the sheet-steel industry with material rolled down to 12, 14, or 16 gage in the form of hot strip steel, and permit the experienced sheet-steel manufacturer to finish this material into the various grades required by the sheet consumer? In this way there would be sufficient tonnage available for the wide-strip steel manufacturer to finish this material into the various grades required by the sheet consumers. In this way there would be sufficient tonnage available for the wide-strip steel operator to keep his mill in continuous operation, and still make use of the existing sheet-steel finishing capacity in this country.

The discussion by Lloyd Jones took the form of what was practically an independent paper dealing with four-high and cluster-type mills. This will be published separately in an early issue of MECHANICAL ENGINEERING.

Mr. Phelps' paper on Super Refractories dealt with the principal developments in connection with production of improved refractories for metallurgical and boiler furnaces, and among other things called for greater coöperation between the consumers and manufacturers of refractories. The formulation of standard specifications was also advocated by the author.

This latter idea was questioned by Alexander Dow, president of the Detroit Edison Co. and President-Elect of the A.S.M.E., who cited the varying conditions of operating furnaces in support of his position. O. H. Davison, of the United States Refractories Co., Pittsburgh, G. C. Coolidge, of the Harbison-Walker Refractories Co., Pittsburgh, and M. H. Terman, of the refractories division of the Babcock & Wilcox Co., Pittsburgh, also discussed the paper. Mr. Coolidge did not think there was enough coöperation between consumers and makers of refractories. A point was made by Mr. Terman that if consumers' specifications were followed per se they could not fail to lead to trouble. Mr. Davison thought better bricks were certain with the use of machine molds and the washing out of impurities in the raw materials.

The Dinner Addresses

At the dinner James A. Campbell told the engineers present that, regardless of efforts which might be made to saddle the burden upon other divisions of a company, the final responsibility for spending money in steel-plant extensions and improvements fell upon the chief engineers of the companies. This was an age of specialists, he said, and no chief engineer could know enough about all kinds of steel-plant installations to qualify as an expert in them all. The chief engineer of Mr. Campbell's company was responsible for expenditures of $21,000,000 last year, and for an outlay of $6,000,000 for a new boiler plant now under construction.

President Schwab went his happiest mood one better with amusing stories to illustrate every serious point he made in his talk. As in many of his recent addresses, he said that the industry, in utilizing its resources without a fair return, was headed toward destruction. He thought economies in production costs had been about exhausted and that in the future the savings must come in the deliveries to and the servicing of customers. The differences in producing costs of the leading steel companies could be measured in cents a ton, and there was no good reason why there should not be coöperation instead of antagonism among the manufacturers.

He made a strong plea for cordial relations between manufacturers and urged that the good-fellowship should not end there but should go down through the ranks and bring to the workmen the same thrill from labor that employers got from providing it through the investment of money. Human engineering, that disposition which prompted the man in the ranks to put the same soul and spirit into his work that he would if he owned the company, was needed now, and Mr. Schwab said that that would be the subject of his address when he quits the office of president of the Society, next month.

Alexander Dow, President-Elect of the Society, told of some of the problems which have to be met and solved in the operation of public utilities, the necessity of thinking and planning for construction three to six years in advance of the demand; and the barometric value in gaging business conditions in the variation in the consumption of electric power. He mentioned as worthy of the study of the engineers falling commodity prices, stationary labor rates, and diminishing returns on capital, with an idea of finding the solution. The gain in output per man was saving the situation temporarily, but the time was coming, he warned, when foreign countries, which were learning our ways, would provide increased competition for American industries.

There was a limit to the increase in per man output, Mr. Dow pointed out, and in some way, either by some sort of governmental supervision such as was now exercised over the railroads, by shaving of sales expense, or from mutual good will among manufacturers which would make all regard price cutting as something unethical, there was a problem for all industry to solve, which must be faced in the next few years if capital was to have a fair return and living standards were not to be lowered.

First National Fuels Meeting Held in St. Louis

CONSIDERING the large attendance at the First National Fuels Meeting, held under the auspices of the Fuels Division of the Society in St. Louis, Mo., October 10 to 13, 1927, one may feel justified in concluding that a goodly number of those who still retained pleasant memories of the 1920 Spring Meeting also held in St. Louis, returned and brought along several converts. From the standpoints of total attendance, attendance at sessions, quality of papers, and spontaneity of discussion, the meeting was one of the most successful ever held by the Society, and certainly the most successful of the recently inaugurated national meetings for Divisions. The ambition of the Arrangements Committee to make it a forum for all engineers regardless of society affiliations seems to have been fully realized.

Technical Sessions

The meeting was formally opened at 10:30 a.m. Monday October 10th by John Van Brunt, chairman of the Fuels Division Executive Committee. After City Registrar J. H. Grosse had presented the greetings of Mayor Victor J. Miller, Prof. S. W. Parr delivered an address on Fuels, Past and Prospective.

The afternoon session, a general one, convened at 2:00 o'clock with C. H. Berry in the chair. Three papers were presented, as follows: American Fuel Resources, by O. P. Hood; Combustion and Heat Transfer, by Prof. R. T. Haslam and H. C. Hottel, and Recent Developments in Low-Temperature Coal Carbonization, by H. D. Savage. Mr. Hood discussed the growing appreciation of the value of fuel and mentioned the fuel resources available. Types of heat transmission peculiar to combustion processes were discussed by Professor Haslam and Mr. Hottel. The economies of low-temperature distillation from a dollars-and-cents standpoint proved very interesting as presented by Mr. Savage.

Two sessions, Industrial and General, occupied the morning of the second day. Both convened at 9:30 a.m., the Industrial Session under the chairmanship of A. D. Bailey, with O. P. Hood wielding the gavel in the General Session.

In the former, Prof. W. Trinks compared progress in engineering with the tendency toward fuel saving in his paper on the High Cost of Fuel Saving, and gave some of the reasons for failure to devote attention to fuel-saving equipment. In his contributions on the Application of Powdered Fuel to Smaller Boilers of Industrial Plants, H. Kreisinger mentioned limitations in design and operation which make attainment of high efficiencies impractical.

In the General Session a paper on the Clinkering of Coal Ash as Related to Laboratory Fusibility Determinations, by A. C. Fieldner, W. A. Selvig, and P. Nicholls, constituted a report of the investigation of 21 coals, ranging in ash fusibility from 1990 to 2930 deg. fahr. Touching a very popular subject, Morgan B. Smith enumerated the leading factors in coal selection in a paper entitled Factors Governing the Purchase of Fuels. Refractories for High Temperatures was the title of a paper by Stewart Phelps describing conditions encountered in boiler settings of normal design.

But one session occupied the afternoon period: that on Power Plants, W. L. Abbott presiding. E. R. Fish discussed Characteristics of Modern Boilers, featuring the development of boilers from early installation of small capacity to the modern high-pressure type. A very interesting contribution in this session was the paper by H. M. Cushing and R. P. Moore on Direct-Fired Powdered-Fuel Boilers with Well-Type Furnaces at Charles R. Huntley Station. The evolution of furnace design was described, and operating results were included.

Wednesday morning also was devoted to two sessions, Industrial and Power Plant. Three papers were presented in the Industrial Session, which was presided over by Prof. E. L. Ohle, as follows: Progress in Gas-Producer Practice, by W. B. Chapman; the Use of Fuels in Brick Kilns, by W. E. Rice, and Burning of Liquid Fuels, by Ernest H. Peabody.

Mr. Chapman traced the development of gas producers, giving a review of the growth of the industry in which such equipment is used, and discussed reasons for the adoption of improvements and the effects produced by their use. The purpose of the paper by Mr. Rice was to familiarize fuel engineers with the peculiar requirements of brick-kiln operation. Mr. Peabody discussed oil reserves and shale deposits. Progress in the production of synthetic fuels and other fuels than gasoline for use in motors was described, and economy in the burning of liquid fuels was urged.

E. H. Tenney presided over the Power Plant Session at which papers by F. H. Daniels on the Characteristics of Modern Stokers, Frank M. Van Deventer on Air Preheaters, and T. A. Peebles on Automatic Combustion Control were presented.

Characteristics demanded of modern stokers and the way in which requirements are met by traveling-grate and multiple-retort underfeed types of stokers were treated by Mr. Daniels. Mr. Van Deventer outlined the several chronological steps of development which led to the air preheater and included a brief description of the principal types available. He also discussed the conditions affecting the selection of a preheater and gave an outline of the economic problem. Early attempts to control combustion were described by Mr. Peebles, and the importance of correct design pointed out.

As on the previous day, a single session occupied the afternoon period: this time a General Session presided over by Prof. E. C. Schmidt. The first paper was by William Beury, on Coal and Coal Preparation from Standpoint of Quality. The Economics of Dry-Quenching Coke by the Sulzer Process were enumerated by A. M. Beebee in a paper describing an installation at the Rochester Gas and Electric Corporation's plant. A seldom discussed problem, that of Smoke Prevention on Railways, was treated by J. B. Irwin.

The final day of the meeting was devoted entirely to smoke abatement. In the morning session, John Hunter presiding, Dr. George T. Moore presented the results of attempts to measure atmospheric conditions in his paper on the Measurement of Atmospheric Smoke Pollution. Colonel Elliott H. Whitlock described Smoke Abatement Methods used in Cleveland, and Erle Ormsby offered very valuable advice in his paper on Organizing a Smoke Abatement Campaign.

The afternoon session convened at 2:00 o'clock with William G. Christy in the chair. Two papers, Smokeless and Efficient Firing of Domestic Furnaces, by Victor J. Azbe, and the Effect of Atmospheric Smoke Pollution—A Summary of Opinion from Current Literature, by Prof. A. S. Langsdorf, were presented.

A wealth of discussion was recorded in each session, but it would be an obvious mistake to attempt to review this in a few words. However, a complete report will be reserved for later publication in the Fuels Division Quarterly. Several of the papers have already been published—in the October and November issues of Mechanical Engineering, and their discussions will be given the attention they deserve.

Non-Technical Events

In addition to the Technical Sessions, visitors to the meeting were permitted to inspect a large number of plants in and around St. Louis. An innovation was introduced in that, instead of the usual organized tours, visitors were permitted to select from a large list of available plants those of greatest interest to them, after which transportation and guides were provided.

The carefully planned entertainment events won the praises of everyone. The Smoker, on Monday evening was especially enjoyed by the men, and Tuesday evening found both ladies and gentlemen at the banquet and dance. Throughout the four days of the meeting the ladies were shown about the city and enjoyed shopping tours, bridge parties, and teas while the sessions were in progress.

O. P. Hood acted as toastmaster at the dinner, and short talks were presented by Past-President John L. Harrington, President Schwab's representative at the meeting, Colonel H. D. Savage, Past-President W. L. Abbott, and Philip Moore, Past-President of the A.I.M.E. The principal address of the evening was delivered by L. W. Wallace, Executive Secretary of the American Engineering Council. The important part played by fuels in our international affairs was stressed by the speaker.

American Gear Manufacturers Hold Meeting

THE semi-annual meeting of the American Gear Manufacturers' Association in Montreal, October 20–22, 1927, was of particular interest as it marked the passing of the tenth yearly milestone of the association, which was formed on March 29, 1917, at Lakewood, N. J., by representatives of nine gear manufacturers who gathered to inspect certain gears made of non-metallic substances by the Westinghouse Electric & Manufacturing Co.

In addition to the presentation and discussion of papers, a great deal of attention was paid to the matter of standardization, and a special committee was appointed to consider matters of standardizing hobs and cutters, this following the presentation of a paper by Prof. Jas. A. Hall (Mem. A.S.M.E.) of the Brown & Sharpe Mfg. Co., Providence, R. I., on The Effect of Hob Corrections in Gear Teeth, and the presentation of a committee report by H. J. Eberhardt (Mem. A.S.M.E.). D. T. Hamilton (Mem. A.S.M.E.), of the Fellows Gear Shaper Co. and F. E. McMullan, of the Gleason Works, Rochester, made reports on the matter of nomenclature, the latter presenting a draft of bevel- and spiral-gear nomenclature. The matter of spur gears formed the subject of several reports, one dealing with recommended practice for commercial spur-gearing backlash measured on standard center distance with feeler, by the Spur Gear Committee of which J. L. Williamson (Mem. A.S.M.E.), of the Fellows Gear Shaper Co., Springfield, Vt., is chairman. Another report, by L. F. Burnham, of the R. D. Nuttall Co., related to the Development of General Horespower Formulas and Standard Proportions.

Another important development of the convention was the report on keyways and shafting, presented by H. J. Eberhardt in the absence of R. B. Zerfey. Mr. Eberhardt is chairman of the Tooth Form Committee, and the general discussion at this point of the program covered both shafts and gear teeth. It was pointed out that the American Petroleum Association already has requested the American Engineering Standards Committee to consider the establishing of standard shaft sizes above 6 in. in diameter, which size is the top limit of the standards already established by the American Gear Manufacturers' Association. In view of all this it was voted to refer to The American Society of Mechanical Engineers a request for standardized dimensions for shafting and keyways from 6 to 12 in. in diameter.

Of the papers presented the following may be mentioned. Professor Hall, as mentioned above, discussed the effect of Hob Corrections on Gear Teeth. His paper was devoted primarily to the relation between the modification of the hob and that of the gear tooth, rather than with the proper form of tip relief, and gave the methods developed by the Brown & Sharpe Company for the study of the problem. Equations and curves were given for determining the tip relief, radial relief, and entrance angle on any chosen size of gear when cut with a hob of known shape. Using hobs with straight-line corrections, methods of determining the hob shape to yield to any desired tip and radial corrections were developed by the author.

Various concerns, Professor Hall said, used different methods for determining the form of hob or cutting tool required to generate the desired shape of gear teeth. One of these systems used an arc of a circle, while the other four had straight-line modifications of the hob. The pressure angles and other characteristics were different in the different systems.

To get a basis of comparison of the above systems, the reasons for tip correction must be considered. Due to elastic deformation of the material under load there was a tendency to decrease the normal pitch where the teeth were coming into contact, on the driving gear and to increase it on the driven gear. Still greater differences might be caused by variations in manufacture. When the normal pitch was shorter on the driving gear, the teeth came into contact ahead of the proper position, tending to cause gouging of the dedendum of the driving by the tip of the driven gear tooth. This also caused impact and sudden acceleration with its tendency to noise and wear. Where the normal pitch was greater on the driving gear, one tooth tended to carry the load and then drop it suddenly on to the next tooth. The function of tip relief was therefore to smooth out unevenness in action due to elastic deformation of the teeth and to variations in normal pitch within the manufacturing tolerances.

The amount of relief on the circumference of the gear, called "tip correction" by the author, should be sufficient to eliminate impact under the greatest allowable differences in normal pitch. Larger tip corrections than this should be avoided as they produced an effect equivalent to cutting off the tops of the teeth. The depth of the relief on the tooth curve, which was termed "radial correction," should be sufficient to provide a gradual pick-up of the load. If the radial correction was too short compared with the top correction, the load would be picked up suddenly at the beginning of the unrelieved section of the tooth curve, and the tops of the teeth might well be eliminated. On the other hand, if the radial correction was too long, the length of active tooth face might be reduced so much that the ratio of the arc of action to the circular pitch would become less than unity and continuity of action be lost.

The author also described a method for determining the relation between the hob shape and the gear shape, based on the relation between the addendum length and the involute angle, but stated that if the addendum length was expressed in per cent of pitch radius, values of the involute angle could readily be calculated for any pressure angle and any desired series of addendum percentages. The equation giving this relation was developed in an appendix to the paper.

One of the dangers in the use of tip relief, particularly in the case of the larger pressure angles, was that the radial correction might be made so long that the arc of action would become less than the circular pitch, and continuity of action be lost. For this reason, when corrected hobs were being designed the number of teeth in contact under the worst conditions should be calculated. A chart was given to handle this problem and limitations of the procedure suggested were discussed.

Clifford B. LePage, assistant secretary of The American Society of Mechanical Engineers, offered Some Observations on the Making of American Standards. The principal aim of his paper was to discuss the proposition that the establishment of national or "American Standards" by the present A.E.S.C. method or a similar one was a logical development in American industry. The first argument which he presented in support of the proposition that the formation of national or "American standards" is a national evolution, was founded on the fact that the standardization process rightly conceived and executed was a dynamic or vital process. His second argument for national standards was that their development gave the consumer an opportunity to have a voice in the establishment of standards for products which he intended to purchase. In buying and selling there were two interested parties, and standard specifications were of advantage to both. The users' interest in such standards centered around interchangeability of component parts, prompt filling of orders from the stocks of the manufacturer, ready replacement of damaged and worn parts, avoidance of misunderstanding by a uniform nomenclature, and not infrequently the reduction of the selling price. In a word, he had interests which were similar in some respects to those of the manufacturer, but which were enough different to justify his having a place in the standardization program.

Worm Gear Inspection and Testing by G. H. Acker (Mem. A.S.M.E.), of the Cleveland Worm and Gear Co., pointed out the methods of testing and potential sources of wear in worm gearing, as well as the design and operation of gages employed in the testing of worms. The author attached great importance to the matter of lubrication of worm gears and went so far as to say that accurate workmanship and the best of materials were no better in the performance of the gearing than the lubricant allowed them to be.

A. A. Ross, engineer of the Gear Department of the General Electric Co., Lynn, Mass., told of some of the experiences of the General Electric Co. in the building of marine gear drives. He described the laminated-type gear stating its advantages and limitations, and also tests on the tanker *Wilhelm Jebsen*, which were made with a large flexible coupling between the gear and propeller shaft to discover the cause for momentary overloads.

The American Iron and Steel Institute Meeting

The American Iron and Steel Institute was founded in 1908. The late Judge Elbert H. Gary, in whose mind the idea of the Institute originated, was its first president, and was annually reëlected to that office until death removed him from further consideration in that respect.

While its name was frankly patterned after that of the Iron and Steel Institute in London, there is a material difference between the two organizations. The British Institute is formally international in scope and is devoted generally to technical matters. The American Iron and Steel Institute limits itself to matters concerning the three great nations of the northern continent, Mexico, United States, and Canada, while the scope of the organization includes, in addition to purely technical matters, trades statistics, commercial economics, and social conditions affecting the industry.

The functions of the Institute have developed along three main lines: technical, statistical, and social. Technical papers are presented at the two general meetings held each year, usually in May and October. In addition, the Institute compiles and publishes annual statistics. This latter activity is much broader than the mere compilation of figures—for example, two years ago the Institute undertook a survey of the actual capacity of the steel industry of the United States. Much attention has been given to questions of safety, sanitation, and welfare. In the latter connection, the work of the Institute dealing with the elimination of the twelve-hour day in steel mills is of truly historical significance.

The meeting of the Institute of October 28, 1927, attracted quite unusual attention because of the election of a new president to succeed the late Judge Gary. On nomination by James A. Farrell, president of the U. S. Steel Corporation, Charles M. Schwab was elected. Mr. Schwab is the first man to combine at the same time the presidency of The American Society of Mechanical Engineers with that of the American Iron and Steel Institute.

Following the usual custom of the Institute, Mr. Schwab made some remarks about business which attracted wide attention. These are quoted (in part) verbatim.

> We have been through a pretty bad time. We have not been running full. During this past week, however, orders have shown an improvement. And we, the members of the Institute, feel that the anticipations of better business in the future are being gradually realized. There is one thing that we must get into our minds. We have spent vast sums in the development of our plants and the economies of operation. I attended a meeting of the Bethlehem Company yesterday, and Mr. Grace showed that our company had spent $167,000,000 in four years in the development of our plants. We have made less money than we ever made before, notwithstanding the vast savings made in that direction. We have given away in other directions all the savings that we made in this vast expenditure of capital.
>
> Now the next great move of the steel industry must be the proper and economic distribution and selling of its product. I do not mean to say that we have anything in mind that is not in strict conformity with the regulations and laws of the country; that always must be fundamental in this institution. But I do say that destructive competition in an industry as large as ours, for the sole purpose of gaining a position in the industry, is ill-advised and costly to the people who have their money in the industry. Think of the fact that eight or nine billions of dollars are invested in the steel industry, and on the average we are not earning as much on our investment as we would if we had put our money in gilt-edge bonds. That is a wrong condition. What we want in this industry is the sincere and hearty coöperation of everybody in it. As Judge Gary has so often expressed it: live and let live. These works are here and we have our customers and we have our trade and we have our position, and therefore we must try to respect our relative positions and see if we cannot do something toward the betterment of our returns, profits, and business. That is the real purpose of the coöperative spirit that is necessary for the betterment of our business and the industry.

Six technical papers were read. William A. Forbes, assistant to the president of the U. S. Steel Corporation, discussed the progress of technology of steel. In the field of furnace construction and design, he said, the trend had been toward refinement of existing furnace types, rather than any marked departure. The principal feature of the modern blast furnace was its large production of pig iron as compared with former operation.

One of the outstanding problems under continual study by the steel industry pertaining to blast-furnace operation, he said, was the problem of sintering or briquetting of flue dust, and also of fine ores, and their economy as compared with using these materials unconditioned. An interesting development had taken place in the use of large tilting furnaces for high scrap charges. It had been found that these large tilting furnaces were advantageous in taking care of peak production by duplexing; or in large scrap charges, when high production was not necessary.

One of the most important changes in open-hearth practice had been the general increase in the use of tar and coke-oven gas, replacing producer gas and natural gas.

Among the outstanding features had been the venturi or modified venturi furnace, the sloping back wall, the use of suspended roofs, and the installation of notably large-sized stationary basic open-hearth furnaces at some plants.

In stripping and heating, the general practice now was to have a stated time that the steel must remain in the molds before stripping, and a minimum time before it might be drawn from the soaking pit for rolling. This insured a solid ingot when rolled.

The principal technological development in the seamless-tube industry had been to make available hot-finished pipe and tubing of suitable quality in place of cold-drawn tubing.

Stephen Badlam, consulting engineer, Pittsburgh, Pa., told about strip-sheet practice. While representing a development of nearly fifty years, he said, it was quite lately that it had attracted the greatest attention of the steel industry. It was too early in the day to predict the future of this new type of mill in which after a century of separate development, the strip mill and sheet mill had come together, but the best minds in the steel industry agreed that it represented a tremendous advance in the art of rolling. That the operation would be a success, and that the broad strip, or continuous sheet mill, had come to stay was generally conceded, but that it would entirely supersede the hand sheet mill was questioned.

James P. Mackenzie, chief chemist of the American Cast Iron Pipe Co., described the so-called "monocast" process for the centrifugal casting of cast-iron pipe. In this process the mold is lined mechanically with sand, molten metal is delivered therein, and the mold is then brought into rotation at a fast rate. It is said that an excellent product is obtained.

T. L. Joseph, supervising engineer of the North Central Experiment Station of the Bureau of Mines at Minneapolis, presented a paper on the physical properties of coke as influencing blast-furnace operation. Among the conclusions which he arrived at were the following:

It was believed that failure to define the properties of coke clearly was partly responsible for retarding progress in correlating coke properties and furnace practice. Combustibility of coke had been widely discussed in the technical press and many views had been expressed as to what constituted differences in combustibility and how such differences might be measured.

The conditions in the fuel beds of hand-fired laboratory furnaces, designed to determine differences in combustibility, were different from those existing at the tuyères of a blast furnace; therefore the distance required to burn completely to CO in a hand-fired furnace could not be taken as a measure of the distance required to accomplish this result in the blast furnace. This distance from the grate bars required to burn completely to CO or the approach to saturation of the gas with carbon, as shown by the gas composition at any point in the fuel bed, could be used to measure relative combustibilities, under properly controlled conditions.

D. L. Mekeel spoke of power plants in steel mills burning cheaper coal. He dealt primarily with the practice of the Jones & Laughlin Steel Corporation. One of the interesting things which he mentioned had to do with the waste-heat-boiler plant. This gave satisfactory service for a number of years with rectangular coke ovens where used. The abandonment of these coke ovens and the replacement of their capacity with by-product ovens rendered the boilers no longer usable and led to their replacement by a modern coal-fired boiler set.

Book Reviews and Library Notes

THE Library is a coöperative activity of the A.S.C.E., the A.I.M.E., the A.S.M.E. and the A.I.E.E. It is administered by the United Engineering Society as a public reference library of engineering and the allied sciences. It contains 150,000 volumes and pamphlets and receives currently most of the important periodicals in its field. It is housed in the Engineering Societies Building, 29 West 39th St., New York, N. Y. In order to place its resources at the disposal of those unable to visit it in person, the Library is prepared to furnish lists of references on engineering subjects, copies of translations of articles, and similar assistance. Charges sufficient to cover the cost of this work are made.

The Library maintains a collection of modern technical books which may be rented by members residing in North America. A rental of five cents a day, plus transportation, is charged. In asking for information, letters should be made as definite as possible, so that the investigator may understand clearly what is desired.

The Mathematics of Engineering

The Mathematics of Engineering. By Ralph E. Root. Williams & Wilkins Co., Baltimore, Md. Cloth, 6 × 9 in., 550 pp., 115 diagrams, $7.50.

THE progressive engineer is coming more and more to the realization that mathematics is one of his most useful tools, and that the most essential part is not the formal work with formulas but a real grasp of the ideas involved. When one has a good grasp of the fundamental notions, it is found that a great deal of the complicated manipulation disappears. One who has mastered this book will have this grasp of the ideas of calculus.

The present volume, by the professor of mathematics in the Post-Graduate School, U.S. Naval Academy, is the outgrowth of a course given in that school for several years. The officers taking this course have had a course in calculus at the Academy before entering the graduate school, so this book contains the material for a second course in the calculus and a sort of intermediate between the usual courses in elementary calculus and advanced calculus. The material is well chosen, and presented clearly and with considerable rigor. To justify the title the author has drawn his illustrations from physics and engineering. There is a good list of well-selected problems at the end of each chapter.

The book can be divided into two parts. The first ten chapters, 290 pages, contain the material generally given in an elementary course in calculus, together with a chapter on analytical geometry and one on algebraic equations and determinants. It is not the aim of the author to leave out things which the engineer might get along without but to put in things which he may find useful. The latter part of the book, comprising Chapters 11 to 18, is more advanced and contains material not usually covered in an elementary course. The titles of these chapters are as follows: Complex Quantities and Periodic Functions, Functions of Several Variables, Treatment of Empirical Data, Ordinary Differential Equations (First Order), Ordinary Differential Equations (Higher Order), Ordinary Differential Equations (Several Variables), Partial Differential Equations, Differential Equations (Additional Devices). In Chapter 11 the fundamental notions of complex numbers and their geometrical representation so useful to the electrical engineer are given in detail. Harmonic functions and Fourier's series are then discussed. Chapter 12 contains more material than is usually given in an elementary course in the subject of partial differentiation. The special application discussed in the text is that of the thermodynamics of a perfect gas. Chapter 13 contains a good introduction to the theory of errors and method of least squares, and also a discussion of empirical equations. The remaining chapters are on differential equations, both ordinary and partial. All the differential equations which an engineer will need are found here with but few exceptions.

The book is well written, but will require study and thought to master it. The engineer who thinks he is going to find in this book a cure for all his troubles without any labor on his part is doomed to disappointment. He will, however, find that if he puts forth enough effort the reward will be great. At the end of each chapter a good list of reference books is given where one can find a fuller treatment of many of the topics. These books are all in English.

C. L. E. Moore.[1]

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Pitfalls for the Purchaser

Your Money's Worth. By Stuart Chase and F. J. Schlink, The MacMillan Company, New York, 1927. Cloth, 5 × 7³/₄ in., 285 pages, $2.

IN THIS book, Messrs. Chase and Schlink come to the aid of the bewildered ultimate consumer in his or her struggle against the magic influence of super-salesmanship. They have dramatized the "Wonderland" of present-day retail markets where worth and price are topsy-turvy. They reveal the struggles between horizontal and vertical subdivisions of industry to secure large sections of that pie-shaped diagram known as the consumer's dollar. They give many instances of quackery, misrepresentation, and adulteration. They indicate the confusion arising from the high-pressure campaigns to market branded goods. Their plea is for more facts and less "bunk" in marketry, and they state the practice of large industrial organizations which have mobilized the best in science and engineering to find out exactly what materials should be bought, and to insure the receipt of goods as ordered.

The book is good reading in spite of many examples of a semitechnical nature which under less skilful treatment would have been dull and pointless. It has an appeal to all ranges of consumers, from the ambitious young housewife, eager to explore all the ramifications of her business, to the bachelor, whose counter purchases are limited to tobacco, toilet articles, and razor blades.

The remedy suggested by the authors is to set up more fact-finding agencies by means of which products may be tested against a reasonable performance standard. In this engineers have an experience and a vital interest which should be utilized to great advantage in dealings with products that are subject to engineering measurement and analysis. A specific example quoted in the book and previously reported in Mechanical Engineering illustrates the point.

The Providence Engineering Society and the B.T.U. Society at Brown University investigated the claims of the manufacturer of an attachment of a domestic heating furnace. Careful tests revealed the falsity of his statements, and the residents of the city were saved a great deal of money. This sets a good example for other local engineering societies. A vigilance committee, working with the local business and trade bureaus, would be of assistance and perform a similar function to that of the American Medical Association in connection with patent medicines.

All this presupposes that the average consumer really wants to get his "money's worth."

A Treatise on Aerodynamics

Aerodynamics. By Edward P. Warner. McGraw-Hill Book Co., New York, Cloth, 6 × 9 in., 598 pp., 328 illus., $5.

SINCE the publication of Bairstow's Applied Aerodynamics in 1918, no important book written in English has appeared in this field. Bairstow's encyclopedic treatise still has much value, but in view of the steady and always increasing volume of reports from the many European and American laboratories, it cannot be said to be up to date. Warner's book is very timely, therefore, and should be of real value to every airplane designer. It deals in twenty-five well-arranged chapters with such topics as the qualities and selection of airfoils; airfoil combinations; surface texture,

ground influence and other miscellaneous airfoil phenomena; scale effect; performance calculations and charts; stability, both static and dynamic; controllability and maneuverability; and spinning.

As an experienced teacher of airplane design, the author has been careful to reduce all mathematical treatment to a minimum, and such mathematical processes as are presented are well within the grasp of the engineer of average mathematical training. No attempt is made to set forth in rigid form the abstruse theories of modern aerodynamics, yet at the same time the physical phenomena underlying aerodynamic data are soundly and clearly presented. The great merit of the book is that it covers the vast field of aerodynamic data comprehensively and accurately, and reduces it to a form entirely suitable for ready and frequent reference by the busy practioner.

A valuable feature is found in the completeness of the references to the literature of each part of the subject. Nor are the references unhandily placed at the end of a chapter, or worse still at the end of the book; they appear as footnotes to the text.

The author has been particularly skillful in his treatment of the subject of Controls and Controllability, which few writers in English publications have ever dealt with at all adequately. In the theoretical treatment of dynamic stability and the theory of spinning, condensation has perhaps been carried too far; but this is unavoidable in view of the comprehensive character of the text. We have no hesitation in saying that the new book is a most valuable addition to aeronautical literature.

ALEXANDER KLEMIN.[1]

Books Received in the Library

AMERICAN SHIP TYPES. By A. C. Hardy. D. Van Nostrand Co., New York, 1927. Cloth, 6 × 9 in., 262 pp., illus., diagrams, $5.

There has developed in the United States, says this author, an important mercantile marine which is entirely domestic and which differs in its characteristics materially from local or domestic shipping in other parts of the world. In this volume he describes the varieties of cargo and passenger vessels, ferryboats, towboats, dredges, and other vessels that have been developed to meet requirements along our coasts, on the Great Lakes, and on our inland waterways. The characteristics of each type and the interrelations of these types are shown, and probable developments are discussed.

DIE BAUTEILE DER DAMPFTURBINEN. By Georg Karrass. Julius Springer, Berlin, 1927. (Einzelkonstruktionen aus dem Maschinenbau, pt. 10.) Paper, 8 × 11 in., 99 pp., illus., diagrams, 10 r.m.

A monograph upon the design of the various elements of steam turbines. The book describes the construction of the various parts as made by the principal European builders and gives the calculations used in their design.

DIE BEKÄMPFUNG DES ERD- UND KURZSCHLUSSES IN HOCHSTSPANNUNGSNETZEN By Paul Bernett. R. Oldenbourg, Munich and Berlin, 1927. Paper, 7 × 10 in., 48 pp., diagrams, tables, 4 r.m.

Discusses the author's experience with methods of protecting transmission lines from grounding and short-circuiting, and also current methods for locating faults in overhead lines.

BOILER FEED WATER PURIFICATION. By Sheppard T. Powell. McGraw-Hill Book Co., New York, 1927. Cloth, 6 × 9 in., 363 pp., illus., diagrams, tables, $4.

Discusses the basic facts of feedwater treatment, with the purpose of assisting the designer of boiler plants to select the type of treatment best suited to each case, and the operator to control the system efficiently. Purification by subsidence, coagulations filtration, chemical treatment, and evaporation are discussed. Chapters are devoted to deaeration and deconcentration. Such allied topics as priming, corrosion, and embrittlement are also treated. Useful lists of references are given.

BRITISH STEAM RAILWAY LOCOMOTIVE, 1825–1925. By E. L. Ahrons. Locomotive Publishing Co., London, 1927. Cloth, 9 × 11 in., 391 pp., illus., portrait, diagrams, tables, 30s.

The work of an engineer well versed in the principles of locomotive engineering and thoroughly acquainted with locomotive history, this book gives an exhaustive, authoritative account of the development of the British locomotive from the first locomotive of the Stockton and Darlington railroad to the present-day types. The work originally appeared as a series of articles in *The Engineer* during 1925. Certain emendations have been made in the book and more illustrations added.

ENGINEERING PROBLEMS MANUAL. By Forest C. Dana and Elmer H. Willmarth. McGraw-Hill Book Co., New York, 1927. Fabrikoid, 5 × 8 in., 187 pp., diagrams, tables, $2.

A number of engineering schools give special courses to beginning students, which are planned to develop good habits of work and study. These courses, commonly known as "Engineering Problems," are based upon practical engineering situations and call for a coördination of mathematics and physics in an engineering atmosphere.

The present work is prepared for the courses given at Iowa State College and is to be used as a notebook for reference when solving problems, in connection with class discussions. It contains specifications for well-organized computation sheets, notes on basic engineering principles and their use, methods of computation, problems, and a collection of tables.

ELEKTRIZITÄT IN DER LANDWIRTSCHAFT. By C. Buschkiel. Walter de Gruyter & Co., Berlin and Leipsig, 1927. (Siemens-Handbücher, bd. 12.) Cloth, 6 × 8 in., 171 pp., illus., tables, 4.50 r.m.

An interesting semi-technical description of the possible uses of electricity on the farm. The ways in which electricity can be used for power, illumination, and heating are explained, directions for selecting and installing proper equipment are given, and economic questions are discussed. A section is devoted to signals, telephones, radio receivers, clocks, etc. The book is profusely illustrated and attractively printed.

FLAME AND COMBUSTION IN GASES. By William A. Bone and Donald T. A. Townend. Longmans, Green & Co., London and New York 1927. Cloth, 6 × 10, 548 pp., illus., plates, diagrams, tables, $12.

A review of the principal researches from the time of Robert Boyle to the present day, with special attention to those of the modern period inaugurated in 1880. The book opens with an historical review of the period of 1660 to 1880. Succeeding sections survey systematically the present state of science concerning the Initiation of Flame and Detonation in Gaseous Explosions, Explosions in Closed Vessels, the Mechanism of Gaseous Combustion, and Catalytic Combustion. Each section has a bibliography.

The chemical aspects of the subject are emphasized, but this extensive exposition of the underlying principles of gaseous combustion will also be of interest to engineers and physicists.

HISTORIC RAILROADS. By Rupert Sargent Holland. Macrae Smith Co., Philadelphia, 1927. Cloth, 7 × 9 in., 343 pp., illus., $4.

A popular account of the origin of the locomotive and of the development of railroads in various lands. Some of the more important railroads in each continent are described. While the book adds nothing new to history, it supplies a readable survey of a wide field.

HISTORY AND DEVELOPMENT OF ROAD TRANSPORT. By James Paterson. Isaac Pitman & Sons, London and New York, 1927. (Pitman's Transport Library.) Cloth, 6 × 9 in., 118 pp., illus., $1.75.

Describes how roads develop, especially those in England, the evolution of the wheeled vehicle, the locomotive and the motor car, road transport during the last century, and the effects of the motor car upon transport. A convenient brief survey of a large subject.

INTERNATIONAL CRITICAL TABLES OF NUMERICAL DATA, PHYSICS, CHEMISTRY AND TECHNOLOGY. Vol. 2. By National Research Council. McGraw-Hill Book Co., New York, 1927. Cloth, 9 × 11 in., 616 pp., diagrams, tables. Sold only on subscription for set of 5 vols., $60, payable at rate of $12 per vol., as issued.

This volume contains the most accurate data available upon the properties of a variety of natural and industrial materials and products. Woods, building stones, ceramic materials, fuels, lubricants, oils and waxes, rubber, leather, insulating materials, and metals are among the more important materials included.

[1] Daniel Guggenheim School of Aeronautics, New York University, New York City. Assoc-Mem. A.S.M.E.

The volume will be indispensable in manufacturing plants, laboratories and engineering offices.

DIE LEHRE VOM TROCKNEN IN GRAPHISCHER DARSTELLUNG. By Karl Reyscher. Second edition. Julius Springer, Berlin, 1927. Paper, 6 × 9 in., 74 pp., diagrams, tables, 4.50 r.m.

Discusses the steps in drying processes on the basis of the Mollier heat diagram. Diagrams are given for air saturated with moisture and for the material undergoing drying, and their use to promote economy in drying practice is illustrated.

MACHINE DESIGN DRAWING ROOM PROBLEMS. By C. D. Albert. Second edition. John Wiley & Sons, New York, 1927. Cloth, 6 × 9 in., 355 pp., illus., diagrams, tables, $3.50.

A complete drawing-room course in general machine design, based upon the author's experience at Cornell University. A knowledge of kinematics, mechanics, and engineering drawing is presupposed.

This edition has been revised and enlarged. The tables have been brought up to date, and certain sections have been rewritten.

MECHANICS OF MACHINERY. By C. W. Ham and E. J. Crane. McGraw-Hill Book Co., New York, 1927. Cloth, 6 × 9 in., 504 pp., illus., diagrams, tables, $4.

This textbook combines in a single volume courses of instruction in mechanism and in the kinematics and dynamics of machinery, the aim being to present enough material to give the student a working knowledge of both these subjects in the time ordinarily available in a curriculum. In the first section the fundamental mechanisms and the theory of their operation are explained. In the second section the student is taught to analyze the forces and the motions in these mechanisms or machines.

MEHRSTIELIGE RAHMEN. By A. Kleinlogel. Second edition. Wilhelm Ernst & Sohn, Berlin, 1927. Paper, 7 × 9 in., 448 pp., 28 r.m.

A large collection of formulas for the solution of statically indeterminate structures, prepared for the use of structural engineers. The formulas cover all the systems that ordinarily are met with in practice, and in each case a complete solution is provided. The work will be of great assistance to designers, by shortening computations.

METHODS AND PLANT FOR EXCAVATION AND EMBANKMENT. By Charles H. Paul and Charles S. Bennett. McGraw-Hill Book Co., New York, 1927. Cloth, 6 × 9 in., 328 pp., illus., tables, $4.

Brings together data, obtained from the experience of the authors and others, regarding the more common types of excavators, and the usual methods of handling excavation and embankment. Performance records and costs with various methods are given. The book will be helpful in selecting the method best adapted to a specified job from the many possible methods now available for large-scale excavation.

MODERN ELECTRICAL ILLUMINATION. By Cyril Sylvester and Thomas E. Ritchie. Longmans, Green & Co., 1927. Cloth, 7 × 10 in., 416 pp., illus., tables, $15.

After explaining the principles of illumination and vision, the book discusses the lighting of shops, stores, streets, public buildings, theaters, dwellings, trains, etc. Chapters are devoted to floodlighting, stage lighting, train lighting, and to miscellaneous subjects. The book covers the subject in detail and contains many excellent photographs showing current English practice.

MODERN WATER WORKS PRACTICE. By F. Johnstone Taylor. Ernest Benn, London, 1927. Cloth, 5 × 8 in., 272 pp., illus., tables, 18s.

A treatise covering the essential features of water works of moderate size. Modern methods of construction are discussed as well as modern methods of pumping and purification.

PHYSICS FOR COLLEGES. By H. Horton Sheldon, C. V. Kent, Carl W. Miller and Robert F. Paton. D. Van Nostrand Co., New York, 1927. Cloth, 6 × 9 in., 655 pp., illus., $3.75.

A general text, the work of four experienced teachers, each of whom has prepared a section of the book. The text is readable and classical and modern concepts are interwoven throughout. The book has been tested by class-room use before publication.

POCKET-BOOK OF MARINE ENGINEERING RULES AND TABLES. By A. E. Seaton and H. M. Rounthwaite. Seventeenth edition. Charles Griffin & Co., London, 1927. Fabrikoid, 4 × 6 in., 770 pp., diagrams, tables, 8s 6d.

Since the last edition of this well-known pocketbook, some changes in procedure and practice in marine engineering have taken place. These have been noticed in this edition, and the text has been brought up to date.

SCIENTIFIC MARKETING MANAGEMENT. By Percival White. Harper & Bros., New York, 1927. Cloth, 6 × 9 in., 318 pp., graphs, charts, $4.

The aim of this book is to present the principles and general procedure of scientific marketing, so far as they have been developed, and to illustrate their application to specific cases. The book should assist those who wish to build a system of marketing for an individual company.

STEAM AND GAS TURBINES, with a Supplement on the Prospects of the Thermal Prime Mover. By A. Stodola, translated from the Sixth German edition by Louis C. Loewenstein. McGraw-Hill Book Co., New York, 1927. 2 vols. Cloth, 7 × 10 in., illus., diagrams, charts, $15.

Stodola's masterly treatise is so well known that no introduction is necessary. First published in 1903, it at once was adopted as a standard work and later editions have kept it in the front rank.

This, the first English edition since 1906, is based on the sixth German edition. To all intents and purposes, it is a new book. Expanded to six times the size of its predecessor, it has been revised and rearranged and given a wealth of drawings and photographs. It will be welcomed by all who wish a scientific presentation that is clear, complete, and thorough.

UNTERSUCHUNGEN ÜBER DEN EINFLUSS DES DRUCKES AUF DIE ZÄHIGKEIT VON ÖLEN UND SEINE BEDEUTUNG FÜR DIE SCHMIERTECHNIK. By S. Kiesskalt. (Forschungsarbeiten auf dem Gebiete des Ingenieurwesens, heft 29.) V.D.I. Verlag, 1927. Paper, 8 × 11 in., 17 pp., illus., diagrs., 3.50 r.m.

An investigation undertaken at the Carlsruhe Technical High School with the purpose of throwing light upon the properties of lubricating oils when used in partially lubricated bearings. Systematic measurements of viscosity were made at 20, 50, and 80 deg. cent., at pressures up to 600 atmospheres. Empirical formulas for pressure viscosity and temperature viscosity are derived, and the constants for the two properties made consistent. The literature on the subject is reviewed.

WARMETECHNISCHE BERECHNUNG DER FEUERUNGS- UND DAMPFKESSEL-ANLAGEN. By Friedrich Nuber. Fourth edition. R. Oldenbourg, Munich and Berlin, 1927. Cloth, 4 × 7 in., 116 pp., diagrams, tables, 4.20 r.m.

Brings together in a book of convenient size for the pocket, the principles, formulas, experimental data, and other information required by designers and operators of industrial heating plants and boiler plants. The book is not a text for students, but a convenient practical reference work for the engineer. Four editions have appeared in eight years.

WEHR- UND STAUANLAGEN. By Paul Böss. Walter de Gruyter & Co., Berlin and Leipsig, 1927. Cloth, 4 × 6 in., 132 pp., illus., diagrams, 1.50 r.m.

Intended to give the student a brief survey of the various possibilities for storing water and of the principal points to be considered in planning and building storage works. The different types of dams are described, and the static and hydraulic equations necessary for designing them are given.

YEAR BOOK ON COMMERCIAL ARBITRATION IN THE UNITED STATES. 1927. By American Arbitration Association. Oxford University Press—American Branch, New York, 1927. Cloth, 6 × 9 in., 1170 pp., $7.50.

This year book gives a picture of the existing facilities for the settlement of commercial disputes without recourse to litigation which have been set up by trade associations, chambers of commerce, states, and other organizations. The methods of each organization are given, with the text of its regulations and with information upon its activities, officers, etc. The statutes of the states that employ arbitration are analyzed and the text of the recent United States Arbitration Act is printed. The work is a valuable summary of American practice.

THE ENGINEERING INDEX

(Registered United States, Great Britain and Canada)

Mechanical Engineering Section

THE ENGINEERING INDEX presents each month, in conveniently classified form, items descriptive of the articles appearing in the current issues of the world's engineering and scientific press of particular interest to mechanical engineers. At the end of the year the monthly instalments are combined along with items dealing with civil, electrical, mining, and other branches of engineering, and published in book form, this annual volume having regularly appeared since 1906. In the preparation of the Index by the engineering staff of The American Society of Mechanical Engineers some 1200 technical publications received by the Engineering Societies Library (New York) are regularly reviewed, thus bringing the great resources of that library to the entire engineering profession.

Photoprint copies (white printing on a black background) of any of the articles listed in the Index may be obtained at a price of 25 cents a page. When ordering photoprints identify the article by quoting from the index item: (1) Title of article; (2) Name of periodical in which it appeared; (3) Volume, number, and date of publication of periodical; (4) Page numbers. A remittance of 25 cents a page should accompany the order. Orders should be sent to the Engineering Societies Library, 29 West 39th Street, New York.

ABRASIVE WHEELS

Developments. The Make-up of Grinding Wheels, H. Bentley. Indus. Mgmt. (Lond.), vol. 13, no. 10, Oct. 1926, pp. 441–442. Emery and corundum, the ideal grinding material; wheel wear; grade and grain; grinding metals.

Manufacture. The Manufacture of Grinding Wheels, H. A. Plusch. Ceramist, vol. 8, no. 7, Oct. 1926, pp. 429–444, 16 figs. Crushing and preparation; aluminous abrasives; plant procedure; compositions best suited for grinding; grain and grade of grinding.

ABRASIVES

Sand. Preparation of Abrasive Sand, W. M. Weigel. Abrasive Industry, vol. 7, no. 11, Nov. 1926, pp. 348–349, 6 figs. Abrasive sand is used for sand-blasting and glass grinding; improved abrasives replace sand for abrasive paper and cloth coating.

ACCELEROMETERS

Recording. Cambridge Recording Accelerometers. Mech. World, vol. 80, no. 2078, Oct. 29, 1926, pp. 347–348, 5 figs. Two-component accelerometer taking simultaneous records of accelerations in two directions perpendicular to each other.

AERODYNAMICS

Lift Distribution over Thin Wing. The Distribution of Lift Over Thin Wing Sections, C. A. Shook. Am. Jl. of Mathematics, vol. 48, no. 3, July 1926, pp. 183–203, 4 figs. Uniplanar flow in general; flow about circle and line; lift and moment coefficients for straight line; lift and moment coefficients for thin-wing section; application of general solution to tail plane; density of pressure; hinge force; hinge moment of elevator force; method of computation.

AIR CONDITIONING

Temperature, Humidity and Air-Motion Data. Practical Application of Temperature, Humidity, and Air Motion Data to Air Conditioning Problems. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 32, no. 11, Nov. 1926, pp. 737–748, 8 figs. Presents tables giving effective temperature for various wet-bulb and dry-bulb temperatures for still air, with air velocity of 50, 100, 200, 300, 500, and 700 ft. per minute; these tables may be used for determining relative feeling of warmth experienced by person normally clothed and slightly active.

AIRCRAFT CONSTRUCTION MATERIALS

Fusion-Joining. The Fusion-Joining of Metallic Materials Aircraft Construction, S. Daniels. Mech. Eng., vol. 48, no. 11a, Mid-Nov. 1926, pp. 1240–1246, 6 figs. Welding is primarily resorted to where joints form part of main airplane structure; describes technical methods of welding, and points out that oxyacetylene welding has successfully passed experimental stage, while electric-arc welding has not reached anything like same degree of development; gas welding, particularly in fuselage construction, has been applied not only to plain-carbon tubing, but to alloy-steel tubing, particularly chrome-molybdenum; specifications and methods for welding aluminum and aluminum alloys are given; brazing is mainly employed in connection with manufacture of fittings and is not relied upon for structural connections, while soldering is only used for such parts as gasoline lines and wrapped terminals.

AIRPLANE ENGINES

Air-Cooled. Cooling of Air-Cooled Engines by Forced Circulation of Air. Nat. Advisory Committee for Aeronautics—Tech. Memorandums, no. 385, Oct. 1926, 3 pp., 3 figs. Results of tests with system consisting of interior radiator, in which air circulation was obtained by means of negative pressure produced by engine exhaust which was effected with aid of exhaust pipe. Translated from Les Ailes, Sept. 9, 1926.

Cirrus. The A. D. C. Cirrus Mark II Engine. Aeroplane, vol. 31, no. 17, Oct. 27, 1926, pp. 558 and 560, 6 figs. Engine has recently successfully passed (British) Air Ministry 100-hour type test; it is vertical 4-cylinder type, air-cooled and fitted with cast-iron cylinders and detachable aluminum alloy heads.

Gas-Starter System. The Gas Starter System for Aircraft Engines, W. F. Nicholson. Air Ministry—Air Publication, no. 1181, Oct. 1925, 40 pp., 27 figs. System consists of charging cylinders and induction pipes with combustible gasoline-air mixture by means of small power-driven compressor unit, which pumps mixture direct into cylinders through non-return valves which are fitted in them for purpose.

Lion. Lion Series 11B Aero Engine, W. F. Nicholson. Air Ministry—Air Publication, no. 882, Mar. 1926, 77 pp., 44 figs. General description, carburation, lubrication, ignition and gas-starter systems, dismantling, clearance and running fits, reassembling; starting and running notes.

Napier Lion. Progress of the Water-Cooled Napier Lion. Times Trade & Eng. Supplement, vol. 19, no. 432, Oct. 16, 1926, p. 119. Review of developments.

Oil-Injection. Research on Oil-Injection Engines for Aircraft, W. F. Joachim. Mech. Eng., vol. 48, no. 11, Nov. 1926, pp. 1123–1128, 11 figs. Discusses problem of high-speed, high-capacity oil-injection engine; apparatus used and results obtained in fundamental studies conducted on oil sprays injected into compressed gases by means of ultra high-speed motion-picture photography; researches on injection hydraulics and on oil characteristics; special bench tests of injection valves, pumps and miscellaneous fuel-injection equipment; engine tests at high speed carried out at Langley Memorial Aeronautical Laboratory.

Supercharging. Supercharged Aero Engines, R. F. R. Pierce. Roy. Aeronautical Soc.—Jl., vol. 30, no. 190, Oct. 1926, pp. 615–618. Shows importance of supercharging, desirable results brought about by process, and consideration of difficulties; type of fans and method of driving them.

AIRPLANE PROPELLERS

Metal. The Durability of Metal Propellers, T. P. Wright. Aviation, vol. 21, no. 17, Oct. 25, 1926, p. 706, 1 fig. Metal propellers, like all types, need inspection; overlap in multi-engine planes causes excessive vibration and strain.

Model, Tests of. Test of Model Propeller with Symmetrical Blade Sections, E. P. Lesley. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 246, Sept. 1926, 11 pp., 6 figs. Results of tests on model propeller having blade sections with form of Göttingen airfoil No. 409; model is shown to have dynamic pitch and somewhat higher efficiency but lower power coefficient than would be expected of propeller of more conventional sections.

Tests on Thirteen Navy Type Model Propellers, W. F. Durand. Nat. Advisory Committee for Aeronautics—Report, no. 237, 1926, 17 pp., 28 figs. Tests conducted at Stanford University for purpose of determining performance coefficients and characteristics for certain selected series of propellers of form and type as commonly used in recent Navy designs.

AIRPLANES

Airfoils. An Investigation of the Flow of Air Around an Aerofoil of Infinite Span, L. W. Bryant and D. H. Williams. Aeronautical Research Committee—Reports and Memoranda, no. 989, Feb. 1924, 44 pp., 20 figs. Results of model tested in Duplex Tunnel at National Physical Laboratory, field of flow being thoroughly explored with wind-velocity meter; theoretical streamlines corresponding to inviscid fluid flow were determined experimentally; comparison of theoretical and experimental distributions of pressure over surface of airfoil. Includes appendix, by G. I. Taylor, on connection between lift on airfoil in wind and circulation round it.

On the Drag of an Aerofoil for Two-Dimensional Flow, A. Fage and L. J. Jones. Aeronautical Research Committee—Reports and Memoranda, no. 1015, Nov. 1925, 14 pp., 8 figs. Deals exclusively with profile drag of airfoil of infinite span, or in other words, drag for two-dimensional flow.

Arrow. The Arrow Commercial Airplanes. Aviation, vol. 21, no. 20, Nov. 15, 1926, pp. 843–844, 3 figs. Details of two-seater sport plane and five-seater commercial machine.

Convertible Single-Seat. A General Specification for Convertible Single-Seat Aeroplanes. Aeroplane, vol. 31, no. 16, Oct. 20, 1926, pp. 522–530, 4 figs. Following types are covered by this specification: (1) Intercepter fighters, (2) pursuit fighters, (3) training fighters.

De Havilland. The De Havilland Hercules. Aeroplane, vol. 31, no. 15, Oct. 13, 1926, pp. 496, 498, 500, and 502, 13 figs. Three-engined airplane D. H. 66, intended for service on new Cairo-Karachi route to be opened in 1927; equipped with 450-hp. Bristol Jupiter Mk. VI engines; it is equal-winged biplane.

Fairchild. The Fairchild FC-1 Monoplane. Aviation, vol. 21, no. 17, Oct. 25, 1926, pp. 707–709, 6 figs. Commercial closed-cabin monoplane with folding wings; ailerons extend entire span of wing and are employed as wing flaps for altering effective camber of section; results of official full-scale tests.

Flying Boats. See FLYING BOATS.

Gliders. The Rhön Glider Competition 1926 (Ueber den Rhönsegelflug-Wettbewerb 1926), R. Eisenlohr. Zeit. des Vereines deutscher Ingenieure, vol. 70, no. 43, Oct. 23, 1926, pp. 1406–1408, 6 figs. Details of design and performances of planes participating in seventh annual contest; in addition to planes of maximum efficiency, a simple model for educational and training purposes.

Handley-Page. The Handley Page "Hamlet." Flight, vol. 18, no. 41, Oct. 14, 1926, pp. 671–674, 10 figs. Generally speaking, Handley follows normal Handley Page practice as regards construction; equipped with three Bristol "Lucifer" IV engines.

Lift and Drag. Full-Scale and Model Measurements of Lift and Drag of Bristol Fighter with Handley Page Slotted Wings, E. T. Jones, and L. E. Caygill. Aeronautical Research Committee—Reports and Memoranda, no. 1007, Dec. 1925, 9 pp., 14 figs. In case of small leading airfoil full-scale and model maximum lift coefficients are in agreement at 0.74; with large leading airfoil, however, full scale reaches 0.85 as compared with 0.77 for model.

Full-Scale and Model Measurements of Lift and

NOTE.—The abbreviations used in indexing are as follows:
Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

Drag of Bristol Fighter with R. A. F. 32 Wings, E. F. Anderson, L. E. Caygill and R. M. Wood. Aeronautical Research Committee—Reports and Memoranda, no. 1006, Dec. 1925, 5 pp., 7 figs. Maximum lift coefficient is higher for full-scale airplane than for model, but increase is not so large as for R. A. F. 31; minimum drag decreases steadily with increasing VL (product of wind speed by chord).

Light. The British Lightplane Competition. Aviation, vol. 16, no. 18, Nov. 1, 1926, pp. 742–743, 1 fig. Economy in fuel consumption is basis for 1926 tests; engines limited to 170 lb.

The Lightplanes in the Lympne Competition. Aviation, vol. 16, no. 18, Nov. 1, 1926, pp. 743–754, 11 figs. Details of entrants; of 15 types entered, 6 were of new design.

Parachutes. See PARACHUTES.

Pitcairn. The Pitcairn Sesqui-Wing. Aviation, vol. 21, no. 19, Nov. 8, 1926, pp. 802–805, 8 figs. Three-seater commercial plane arranged for quick interchange of engines.

Stability. Simplified Method for Approximate Calculation of Static Longitudinal Stability of Monoplanes and Biplanes (Eine einfache Methode zur angenäherten Berechnung der statischen Längsstabilität von Ein- und Doppeldeckern), T. Bienen. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 17, no. 14, July 28, 1926, pp. 299–305, 8 figs. Author proposes calculation, in which biplane is replaced by equivalent monoplane; equalization of moments, size of control organs, location of center of gravity, etc., can then be determined by fairly simple formulas.

AIRSHIPS

Drag. The Drag of Airships, C. H. Havill. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 247, Sept. 1926, 26 pp., 2 figs. Presents data on deceleration tests for large number of airships; values herein obtained are probable relative values and thus for design and research purposes can be considered as digest of past performance and deceleration data.

The Drag of Airships, Drag of Bare Hulls, C. H. Havill. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 248, Oct. 1926, 17 pp., 18 figs. Empirical method for finding drag coefficients of any bare airship hull with its VL (product of wind speed by chord) curve from 100,000 to 6,400,000 cu. ft. volume; slope of each VL curve differs with each type of hull and its slope is not quite constant.

Research. A Review of the Present Position with Regard to Airship Research and Experiment, V. C. Richmond. Roy. Aeronautical Soc.—Jl., vol. 30, no. 190, Oct. 1926, pp. 547–582 and (discussion) 582–588, 23 figs. Review of present position with regard to theoretical model and full-scale work under two broad headings of study of external forces which act upon airship and internal distribution of stresses in structure arising from these forces. Contains appendix on examination of effect of certain simple wind variations on lateral force exerted at bow of R.33 when moored to mast.

Stress Calculation. On the Calculation of Stresses in the Hulls of Rigid Airships, R. V. Southwell. Roy. Aeronautical Soc.—Jl., vol. 30, no. 191, Nov. 1926, pp. 627–667, 12 figs. Principles and methods of theory of structures, upon which any special method must be based; problem of stress calculation in airships, that is, determination of stresses in hull structure due to loads imposed by gravity and aerodynamic forces, discussed in relation to representative design; work of Airship Stressing Panel is critically reviewed, and latest available ideas incorporated in paragraphs intended to form extension of Panel's report; indication of standard procedure suitable for routine use in design office; includes appendices relating to special problems which have been encountered during progress of new designs.

ALLOYS

Aluminum. See ALUMINUM ALLOYS.

Brass. See BRASS.

Copper. See COPPER ALLOYS.

Iron. See IRON ALLOYS.

ALUMINUM ALLOYS

Aging. Significance of Silicon in the Aging of Aluminum Alloys Containing Lithium or Magnesium (Die Bedeutung des Siliziums für die Vergütbarkeit des Aluminiums durch Li oder Mg), P. Assmann. Zeit. für Metallkunde, vol. 18, no. 8, Aug. 1926, pp. 256–260, 3 figs. Maximum hardness of alloys of lithium or magnesium with commercial aluminum, after quenching from above 500 deg. cent. and aging at 18 deg., is obtained when silicon impurity of aluminum is just sufficient to form silicides Li_2Si or Mg_2Si; with more or less silicon than this, hardness of aged alloy decreases proportionately to excess or deficiency; with very pure aluminum neither lithium nor magnesium produces aging phenomena. See brief translated abstract in Chem. & Industry, vol. 45, no. 42, Oct. 15, 1925, p. 831.

Aluminum-Silicon. The Constitution and Structure of the Commercial Aluminum-Silicon Alloys, A. G. C. Gwyer. Inst. Metals—Advance Paper, no. 404, for mtg. Sept. 1–4, 1926, 43 pp., 54 figs. Constitution, structure, and mechanical properties of modified aluminum-silicon alloys; theory based upon colloidal lines is put forward to explain nature of modified structures; application of this theory to other alloy systems; alloys possess good founding qualities; are appreciably lighter than pure aluminum, and in both chill- and sand-cast states possess high resistance to shock, excellent ductility, and high degree of incorrodibility; contains appendix on properties of modified aluminum-silicon alloys. See also abstract in Foundry Trade Jl., vol. 34, no. 526, Sept. 16, 1926, pp. 247–250, 4 figs., and Engineering, vol. 122, nos. 3169 and 3170, Oct. 8 and 15, 1926, pp. 458–460 and 492–494, 10 figs.

Analysis. The Analysis of Aluminum Alloys, H. H. Shepherd. Foundry Trade Jl., vol. 34, no. 528, Sept. 30, 1926, pp. 284–286, 1 fig. Deals with aluminum-copper, aluminum-copper-tin, and aluminum-zinc-copper alloys; sampling; estimation of silicon, tin and lead; separations of copper, tin and lead for their estimation.

Boron in. Boron in Aluminium and Aluminium Alloys. Metallurgist (Supp. to Engineer, vol. 142, no. 3694), Oct. 29, 1926, pp. 157–159, 1 fig. Review of paper by P. Hænni, published in Revue de Metallurgie, June 1926, giving account of research carried out by author; results of tensile and hardness tests on binary alloys of boron and aluminum; corrosion tests; it would appear that boron is not detrimental and may increase resistance of aluminum to nitric acid.

Duralumin. See DURALUMIN.

AMMONIA COMPRESSORS

Horsepower. Horsepower of Ammonia Compressors, W. H. Motz. Refrigeration, vol. 40, no. 4, Oct. 1926, pp. 43–45, 1 fig. Analysis of indicator cards to obtain indicated horsepower; use of meter readings to determine input electrical horsepower.

AUTOMOBILE ENGINES

Camshafts. The Manufacture of Camshafts. Automobile Engr., vol. 16, no. 220, Oct. 1926, pp. 374–375, 3 figs. Improved methods and equipment employed by well-known automobile manufacturer.

Explosions in. Explosions in Petrol Engines, H. T. Tizard. Faraday Soc.—Trans., vol. 22, no. 69, Oct. 1926, pp. 352–362, 2 figs. Review of recent work bearing on efficiency of gasoline engines.

Phenomena. Inlet and Exhaust Phenomena, K. J. de Juhász. Automobile Engr., vol. 16, no. 220, Oct. 1926, pp. 369–373, 10 figs. Experiments carried out at high speed with special indicator, designed by author, on four-cylinder four-cycle Benz automobile engine at Heat Engines Laboratory of Hungarian Royal Technical College in Budapest.

Six-Cylindered. The Six-Cylinder Vogue. Autocar, vol. 57, no. 1616, Oct. 22, 1926, pp. 714–718, 14 figs. Whys and wherefores of rise in popularity of type, which now forms 36.6 per cent of 1927 models offered to British motorists, as compared with 27 per cent for 1926.

AUTOMOBILE INDUSTRY

United States and Germany. What Can the German Automobile Industry Learn from America? (Was kann die deutscher Automobilindustrie von Amerika Lernen?), P. Friedmann. Zeit. des Vereines deutscher Ingenieure, vol. 70, no. 44, Oct. 30, 1926, pp. 1439–1440. Discusses American conditions and industry; describes type of automobile used by average American workingman, and suggests that similar type should be developed in Germany to stimulate automobile industry.

AUTOMOBILE MANUFACTURING PLANTS

White Motor Co. Increasing Production with New Equipment, C. O. Herb. Machy. (N. Y.), vol. 33, no. 2, Oct. 1926, pp. 81–89, 31 figs. Results obtained by White Motor Co. through installation of latest types of machines and tooling. See also article in same journal, no. 3, Nov. 1926, pp. 205–208, 11 figs., describing equipment installed by company to facilitate transfer of work between operations.

AUTOMOBILES

Daimler. The Daimler "Double-Six." Auto-Motor Jl., vol. 31, no. 40, Oct. 21, 1926, pp. 853–854, 5 figs. Also Autocar, vol. 57, no. 1615, Oct. 15, 1926, pp. 633–636, 11 figs. Entirely new model with 12-cylindered engine of twice capacity of 25-hp. 6-cylindered model.

Daimler-Benz. 24-100-140-Hp. Automobiles with Superchargers (24/100/140-PS-Kraftwagen mit Gebläsemotor), A. Heller. Zeit. des Vereines deutscher Ingenieure, vol. 70, no. 44, Oct. 30, 1926, pp. 1449–1454, 24 figs. Six-cylinder engine with light-metal cylinders, combined circulating and fresh-oil lubrication, supercharger and special carburetor; details of clutch, gear shift, universal joint with continuous circulating lubrication, rear and front axles; made by Daimler-Benz Corp.

Hanomag. The Small Hanomag Motorcar, Heller. Eng. Progress, vol. 7, no. 9, Sept. 1926, pp. 247–249, 6 figs. New Design which satisfies demand for cheap and yet efficient car; complete car with open body weighs 350 kg. and can seat two persons comfortably; speed is 50 to 60 km. per hr.; fuel consumption amounts to only 4 liters per 100 km.

Hillman. The Hillman "Fourteen." Auto-Motor Jl., vol. 31, no. 38, Oct. 7, 1926, pp. 789–791, 10 figs. Equipped with 4-cylinder engine which is 3-point suspended in chassis frame; brakes operate in drums on all four wheels; springs are semi-elliptic on both axles.

Ignition Apparatus. Ignition Apparatus. Autocar, vol. 57, no. 1614, Oct. 8, 1926, pp. 586–588, 7 figs. Review of principal magneto and coil-ignition systems.

Lagonda. A New Lagonda Six. Autocar, vol. 57, no. 1615, Oct. 15, 1926, pp. 637–638, 4 figs. Overhead-valve 2$^1/_2$-liter engine installed in largest model produced for 1927.

Mathis. The New Mathis. Auto-Motor Jl., vol. 31, no. 36, Sept. 23, 1926, pp. 745–747, 9 figs. Small French vehicle with four speeds, and four-wheel brakes.

Maybach. The Maybach Chassis with 7-Liter Engine (Das Maybach-Fahrgestell mit Siebenliter-Motor), P. Friedmann. Zeit. des Vereines deutscher Ingenieure, vol. 70, no. 44, Oct. 30, 1926, pp. 1441–1448, 22 figs. In addition to advantage of being able to run without use of hand lever, an oil-pressure power plant has been added to Maybach car for change speed and 4-wheel brake service; engine has 7 vertical cylinders; details of fuel supply, carburetor, electrical equipment, etc.

Mechanical Features A General Survey of the Mechanical Features of Automobiles for 1927. Autocar, vol. 57, no. 1617, Oct. 29, 1926, pp. 778–785, 15 figs. Shows directions in which evolution is proceeding, and provides standards by which merits of different designs may be measured; material is based upon analysis of features of 308 different types of cars at present on British market; survey of changes and improvements effected during past year.

Olympia Show, England. Olympia Motor Show 1926. Auto-Motor Jl., vol. 31, no. 40, Oct. 21, 1926, pp. 831–850, 35 figs. List of exhibits, alphabetically arranged according to makers, giving in summarized form special features. See also Autocar, vol. 57, no. 1617, Oct. 29, 1926, pp. 813–866, 243 figs.

The Motor Car Show. Engineer, vol. 142, nos. 3693 and 3694, Oct. 22 and 29, 1926, pp. 439–442 and 460–463, 20 figs. There is further increase in number of six-cylinder cars; prospects of coil and battery ignition are much improved among British car users; there is more extended use of light aluminum alloys, especially for reciprocating parts; trend of design with regard to bodies is still towards closed saloon; details of exhibits. See also Engineering, vol. 122, nos. 3171, 3172 and 3173, Oct. 22, 29, Nov. 5, 1926, pp. 502–506, 532–537 and 564–565, 58 figs. partly on supp. plate.

What the Show Reveals. Autocar, vol. 57, no. 1616, Oct. 22, 1926, pp. 705–706, 5 figs. Increasing popularity of 6-cylinder engines and overhead valves; more miniature cars; refinement rather than radical alterations; improved bodies.

Paris Show. New Cars Numerous at Paris Salon, Many Foreign "Sixes," W. F. Bradley. Automotive Industries, vol. 55, no. 17, Oct. 21, 1926, pp. 692–696, 14 figs. Points out that nine-tenths of changes made during past two years have been dictated either directly by American or by changing attitude of buying public by reason of their familiarity with American automobiles; 6-cylinder types predominate; judged by European standards, new sixes are nearly all big.

AUTOMOTIVE FUELS

Anti-Knock Compounds. Report on Dopes and Detonation, H. L. Callendar, R. O. King and C. J. Sims. Aeronautical Research Committee—Reports and Memoranda, no. 1013, Nov. 1925, 54 pp., 15 figs. Investigation to determine physical action that delay or prevent detonation in engine cylinder; unclear theory of detonation explains generally action of dopes in delaying detonation, certainly to extent that it may be taken as guide in searching for anti-detonating substances free from objectionable characteristics of metallic dopes and not subject to limitation of supply in time of emergency.

Future Trends. Future Trends in Automotive Fuels, A. C. Fieldner and R. L. Brown. Indus. & Eng. Chem., vol. 18, no. 10, Oct. 1926, pp. 1009–1014, 1 fig. Future fuel requirement; present trends; trend in engine and automobile design; probable trend when petroleum supply becomes inadequate; sources of petroleum substitutes; motor fuel from coal and other forms of automotive fuel.

Gasoline. See GASOLINE.

Heavy. Experimental Investigation of the Physical Properties of Medium and Heavy Oils, Their Vaporization and Use in Explosion Engines, F. Heinlein. Nat. Advisory Committee for Aeronautics—Tech. Memorandums, no. 384, Oct. 1926, 22 pp., 3 figs. Experimental apparatus; vaporization speed and diffusion coefficient. Translated from Motorwagen, June 30, 1926.

AVIATION

Civil, United States. Civil Aviation in the United States, A. Black. Mech. Eng., vol. 48, no. 11, Nov. 1926, pp. 1092–1094, 2 figs. Traces beginning of American civil aviation to establishment in 1918 of post office air-mail route between New York City and Washington, D. C., and subsequent organization of transcontinental airway; most careful estimates indicate that flying mileage on regular American air routes will, in ensuing year, far surpass that of Great Britain and France.

B

BELTING

Characteristics. Belting of Various Materials and Its Characteristics, H. A. Flogaus. Belting, vol. 29, no. 4, Oct. 1926, pp. 15–17, 4 figs. Leather found to be best material for majority of drives; fabric and composition belts better for certain conditions.

Leather. Recommendations on the Application and Care of Leather Belt Drives, J. R. Hopkins. Indus. Engr., vol. 84, no. 10, Oct. 1926, pp. 464–468 and 486, 4 figs. Factors that should be considered in purchase and installation of this equipment for industrial-plant service.

BELTS

Care and Installation. Care and Installation of Belts, J. H. Rodgers. Machy. (N. Y.), vol. 33, no. 3, Nov. 1926, pp. 166–168, 5 figs. Care necessary in making joint; belt dressing should be used sparingly; direction of belt travel; example of faulty practice.

BEARINGS

Babbitting. Electrically Heated Babbitting Process. Elec. World, vol. 88, no. 20, Nov. 13, 1926, pp. 1019–1020, 1 fig. Describes first complete installation by street railway of electrically heated babbitting equipment installed by Los Angeles Railway; installation consists of three electrically heated and auto-

matically controlled General Electric melting pots and preheating oven.

BEARINGS, BALL

Machine Tools. Use of Ball Bearings in American Machine Tools (Die Anwendung der Kugellager im amerikanischen Werkzeugmaschinenbau), G. Schlesinger. Werkstattstechnik, vol. 20, no. 16, Aug. 15, 1926, pp. 489–513, 96 figs. Developments in application; use for loose pulleys and overhead countershafts, mechanical tools, woodworking machines, polishing and grinding machines; lathes, metalworking machines, etc.; ball-bearing fits.

BEARINGS, ROLLER

Gages. Roller-Bearing Fits in Automobiles and Internal-Combustion Engines (Etwas über die Wälzlagerpassungen im Automobil- und Verbrennungs-Motorenbau), K. Bethge. Werkstattstechnik, vol. 20, no. 16, Aug. 15, 1926, pp. 514–518, 6 figs. Determination of dimensions of gages for roller and ball bearings, choice of gaging, casings, tolerances, etc.

Passenger Cars. Roller Bearings to be Used by C. M. & St. P. Ry. Rev., vol. 79, no. 18, Oct. 30, 1926, pp. 659–661, 4 figs. Tests conducted for period of two years have demonstrated practicability of roller bearings of several types, and their advantages over plain bearings; consequently Chicago Milwaukee & St. Paul Ry. decided to equip 127 passenger cars with roller installations. See also Ry. Age, vol. 81, no. 18, Oct. 30, 1926, pp. 835–838, 4 figs.

BOILER FEEDWATER

Dissolved-Oxygen Recorder. Recorder for Dissolved Oxygen in Feed Water. Engineering, vol. 122, no. 3174, Nov. 12, 1926, p. 610, 2 figs. Instrument, known as Cambridge dissolved-oxygen recorder, gives continuous record of quantity of oxygen present in feedwater on chart calibrated in cubic centimeters per liter so that defects in feed system which might otherwise remain unnoticed for long periods, may be instantly detected and remedied.

Foaming and Priming. Present Knowledge of Foaming and Priming of Boiler Water, with Suggestions for Research, C. W. Foulk. Mech. Eng., vol. 48, no. 11a, Mid-Nov. 1926, pp. 1364–1367. Progress report of Sub-Committee No. 3 of Joint Research Committee on Boiler Feedwater Studies on zeolite softeners, internal treatment, priming and foaming, and electrolytic scale prevention.

Hydrogen-Ion Concentrations. The Potentiometric Determination of Hydrogen-Ion Concentrations as Applied to Boiler Waters, W. N. Greer and H. C. Parker. Mech. Eng., vol. 48, no. 11, Nov. 1926, pp. 1129–1132, 7 figs. Methods of controlling boiler water or boiler feedwater; compares various methods of hardness determination; when hydrolyzable salts are present, titration with indicators is only approximate method of determining acidity or alkalinity of solution; it appears that measurement of ion concentration is necessary before any definite relation can be established between concentration of boiler chemicals and caustic embrittlement, foaming, corrosion, formation of scale and other boiler phenomena.

Pretreatment. Pretreatment of Boiler Feedwater, C. R. Knowles. Mech. Eng., vol. 48, no. 11a, Mid-Nov. 1926, pp. 1361–1363. Progress report of Sub-Committee No. 2 of Joint Research Committee on Boiler Feedwater studies on water softening by chemicals (external treatment).

BOILER FIRING

Gasifuel System. The "Gasifuel" System. Machy. Market, no. 1356, Oct. 29, 1926, pp. 25–26, 2 figs. System consists of compact form of gas generator capable of continuously converting both liquid and pulverized fuels into fixed combustible gas, suitable for immediate combustion in usual types of furnaces, whether for steam raising or other purposes; suitable pulverizing and conveying equipment is included in installations using solid fuel.

BOILER FURNACES

Bagasse. Types and Designs of Bagasse Furnace. Planter & Sugar Mfr., vol. 77, nos. 15 and 16, Oct. 9 and 16, 1926, pp. 287–289 and 309–312, 11 figs. Burning of bagasse; design of furnace should be such that gaseous products from three zones should firstly be intimately mixed by passing through constricted passage and impinged on opposite wall of relatively large internal chamber where gases are thoroughly mixed, and by reverberation walls of this chamber became incandescent; list of furnace temperatures; boiler heating surfaces; grate areas; chimney draft; furnace-air supply; preheaters, etc. Oct. 16: Bagasse and combustion; weight and volume of air for combustion.

Grates. Calculation of Grate Surface of a Furnace (Berechnung der Rostfläche einer Feuerung), R. Günther. Feuerungstechnik, vol. 14, no. 24, Sept. 15, 1926, pp. 288–291. Shows what great influence steam and load conditions have on dimensioning of grate surface and how grate size must be adapted to these conditions.

Grate Resistance in Various Kinds of Coal (Rostwiderstand verschiedener Kohlensorten), R. Dawidowski. Zeit. des Oberschlesischen Berg u. Hüttenmännischen Vereins zu Katowice, vol. 65, nos. 10, 11, Oct., Nov. 1926, pp. 660–667, 728–734, 20 figs. Discusses flow of air of combustion in fuel bed for various kinds of coal; adaptability of grates to coals; gas friction in fuel beds, velocity of flow.

Interchangeable Oil and Gas Burners. Oil and Gas Burners are Interchangeable. Power Plant Eng., vol. 30, no. 22, Nov. 15, 1926, pp. 1200–1202, 6 figs. Interesting results obtained in furnaces where gas burners can be replaced on short notice with oil burners at plant of Kansas Gas & Electric Co. at Wichita, Kan.

BOILER OPERATION

Load Determination. Measuring Boiler Load Without Flow Meters, J. D. Jenkins. Power, vol. 64, no. 18, Nov. 2, 1926, p. 658. Author makes use of principle that what comes in, minus what goes out, must equal what stays; this principle is applied to dissolved solids in water entering boiler; from analysis of feed and boiler waters and knowledge of time, boiler has been on and quantity of blowdown, evaporation can be calculated.

BOILER PLATE

Bending Press for. Vertical Bending Press for Boiler Plates, Weil. Eng. Progress, vol. 7, no. 9, Sept. 1926, pp. 253–254, 3 figs. Design developed by Schiess-Defries, Düsseldorf, for electric drive; chief advantage of this process compared with bending rolls is that plates can be completely bent in one operation.

Elastic Strain. Calculating Elastic Strains (Calcul des tensions élastiques), E. Francken. Revue Universelle Des Mines, vol. 11, nos. 5 and 6 and vol. 12, no. 2, Sept. 1, 15 and Oct. 15, 1926, pp. 230–238, 262–273, and 49–63, 14 figs. Discusses boiler resistance; calculates strains in plates of cylindrical horizontal boiler, starting from fundamental equation of fatigue of metal; determination of section of greatest fatigue.

Embrittlement. The Cause and Prevention of Embrittlement of Boiler Plate, S. W. Parr and F. G. Straub. Univ. of Illinois Bul., vol. 23, no. 42, June 23, 1926, pp. 7062, 50 figs. Concludes that embrittlement is caused by combined action of stress and chemical attack; stresses are inherent in construction and in operation of boiler, whereas chemical attack is caused by sodium hydroxide in boiler water; certain methods of water treatment tend to convert some safe waters into characteristic type of water which produces embrittlement; presence of sodium sulphate in feedwater and undecomposed sodium carbonate in boiler water tends to retard embrittling effect of carbonate waters; methods for introducing sulphates in boiler waters have been worked out to point of practical application. Bibliography and data from embrittled boilers.

Intercrystalline Cracks. A New Boiler Steel and Intercrystalline Cracks. Power, vol. 64, no. 17, Oct. 26, 1926, p. 623. Experiments with new boiler steel and cause of intercrystalline cracks were discussed at two meetings recently held in Europe, that of Association of Steam Boiler Inspectors at Zürich, Switzerland, and that of Association of Large Steam Boiler Plants at Cassel, Germany.

BOILERMAKING

Shops. A Boiler Shop Built by Boiler Makers. Boiler Maker, vol. 26, no. 10, Oct. 1926, pp. 279–288, 25 figs. Employees of Union Iron Works build highly efficient modern plant at Erie, Pa., to replace original shop destroyed by fire.

BOILERS

Corrosion. Boiler Corrosion and Possible Combative Measures, W. M. Barr and R. W. Savidge. Chem. & Met. Eng., vol. 33, no. 10, Oct. 1926, pp. 607–608, 6 figs. Effect of strained metal, scale-forming constituents, dissolved oxygen and causticity with special reference to locomotive practice. (Abstract.) Paper read before Am. Inst. Chem. Engrs.

Fusion Welding. Recommended Standing Practices and Standards. Boiler Maker, vol. 26, no. 11, Nov. 1926, pp. 321–326, 5 figs. Action taken at annual meeting of Master Boiler Makers' Assn. on fusion-welding practice.

High-Pressure. High-Pressure Steam Boilers (Hochdruckdampfkessel), F. Kaiser. Zeit. des Bayerischen Revisions-Vereins, vol. 30, nos. 13, 14, 15, 16, 17 and 18, July 15, 31, Aug. 15, 31, Sept. 15 and 30, 1926, pp. 157–161, 171–174, 185–188, 196–199, 209–212 and 219–220, 32 figs. Discusses properties of high-pressure steam, and of iron used in boiler construction; notched-bar strength of iron and alloy steel; suggestions for design of high-pressure boilers, describes most important types of such boilers, boiler construction and operating experiences.

Hot-Water. Performance of Hot-Water Boiler on Variable Load (Das Verhalten eines Warmwasserkessels bei wechselnder Belastung), Pauer. Wärme, vol. 49, no. 36, Sept. 3, 1926, pp. 640–641, 2 figs. Particulars concerning series of tests made to determine efficiency of coke-fired hot-water boiler, at various loads; it was found that efficiency of boiler exceeded 70 per cent at all ratings from 1500 to 300 B.t.u. per sq. ft. of heating surface per hr.; flue-gas loss was particularly low at low ratings. See brief translated abstract in Power Engr., vol. 21, no. 248, Nov. 1926, p. 434.

Intermittent Working. Heat Losses Due to Intermittent Working of Boilers (Abkühlverluste durch Betriebsunterbrechung bei Kesseln verschiedener Bauart), K. Russ. Wärme, vol. 49, no. 39, Sept. 24, 1926, pp. 693–695, 3 figs. Points out that loss due to cooling during idle period is generally greater than all other losses put together, where boilers in intermittent service are concerned, and it is much more important to reduce this loss than to raise steady-load efficiency of boiler by a few per cent; lagging all hot parts of boiler reduces radiation and conduction losses during idle as well as working hours; double dampers should be used to prevent cold air being drawn through combustion chamber, flues and economizer during idle periods; other precautions; gas-fired and waste-heat boilers are specially suitable for intermittent service. See brief translated abstract in Power Engr., vol. 21, no. 248, Nov. 1926, p. 133.

Locomotive. See LOCOMOTIVE BOILERS.

Paxman. The Paxman Economic Boiler. Eng. & Boiler House Rev., vol. 40, no. 4, Oct. 1926, pp. 180–183 and 188, 2 figs. Consists of cylindrical shell with one or more internal flues and number of small return tubes running from end to end.

Waste-Heat. A New and Unique Type of Waste Heat Boiler, W. S. Anderson, Jr. Gas Age-Rec., vol. 58, no. 15, Oct. 9, 1926, pp. 489–491, 3 figs. La Mont boiler is described from gas makers' point of view; it is being offered in combination with La Mont steam sealed hot valves and outlet clapper valve.

Water-Tube. See BOILERS, WATER-TUBE.

BOILERS, WATER-TUBE

Tests. Boiler and Stoker Tests at the High Bridge Station, D. J. Mosshart. South. Power Jl., vol. 44, no. 10, Oct. 1926, pp. 52–57, 6 figs. Data of boiler and stoker test on four 18,722-sq. ft. water-tube boilers.

BRAKES

Machine Tools, Application to. The Application of Brakes to Industrial Machinery, F. C. Stanley. Am. Mach., vol. 65, no. 20, Nov. 11, 1926, pp. 779–781, 5 figs. Claims that machine tools are usually inadequately provided with brakes; function of brake; types of brake suitable for machinery; methods of application; advantages.

BRASS

Direct Production from Ores. Direct Production of Brass from Mixed Ores (Zur Frage der direkten Erzeugung von Messing aus gemischten Erzen), W. M. Guertler. Metall u. Erz, vol. 23, no. 17, 1st Sept. issue, 1926, pp. 468–472, 10 figs. Method of producing brass direct from a lead-zinc-copper ore; by melting mixture of galena, zinc blend with copper, three separate liquids are obtained, namely, copper matte with small lead and zinc contents; a metallic melt with small lead and varying zinc content; and a metallic lead-rich melt, which can be separated in usual way from copper and zinc, and sold as lead.

Hot Rolling. Working of Brass at High Temperatures (Untersuchungen über die Warmverarbeitbarkeit des Messings), K. Hanser. Zeit. für Metallkunde, vol. 18, no. 8, Aug. 1926, pp. 247–255, 13 figs. Presents diagrams showing equilibrium diagram of copper-zinc alloys containing more than 50 per cent copper showing lines of equal compressibility (under static and dynamic pressure), hardness, tensile strength, elongation, and reduction of area; reduction in height of β-brass under dynamic blow remains fairly constant up to 500 deg., then increases rapidly with rise of temperature, whereas with α-brass, slow but steady increase takes place throughout temperature range; results show that reduction in area is best indication of most suitable temperature for working brass.

Working Properties. The Working Properties of Brasses. Brass World, vol. 22, no. 10, Oct. 1926, pp. 325–326, 1 fig. German metallurgists report on investigations with many types of brass; hot-rolling problem when impurities are present in appreciable quantities. Translated from Zeit. für Metallkunde.

C

CAMS

Circular-Arc. Graphical Analysis of Circular-Arc Cams, G. L. Guillert. Am. Mach., vol. 65, no. 18, Oct. 28, 1926, pp. 715–717, 4 figs. Graphical construction of velocity and acceleration curves for flat-faced cam, cam with offset roller, and one with pivoted follower; design of automotive cam.

Screw-Machine. Model for Designing Screw Machine Cams, H. Simon. Machy. (N. Y.), vol. 33, no. 4, Dec. 1926, pp. 281–286, 12 figs. Describes diagram model which solves several problems of cross-slide and turret-tool clearance, turret-tool head and machine-bed clearance, interference of turret-tool stems, cut-down on cam lobes, adjustment of turret slide, limits of turret- and cross-tool locations, interference of turret tools with product, etc.

CAR DUMPERS

Coal. A Large Coal-Shipping Machine or Car Dumper. Engineer, vol. 142, no. 3694, Oct. 29, 1926, pp. 469–470, 6 figs., partly on p. 472. Details of car dumper installed at Toledo on Lake Erie for Ohio Central Railroad, most powerful machine of its kind yet built.

Electric. Balanced Cradle in Car Dumper. Iron Age, vol. 118, no. 21, Nov. 18, 1926, pp. 1410 and 1452, 1 fig. Electrical and largely automatic control features machine at Toledo for handling 120-ton cars.

CARS

Metal-Working Tools for Building. Tools for Building Railroad Cars. Am. Mach., vol. 65, no. 22, Nov. 25, 1926, pp. 859–860. Quantity, type and age of metal-working equipment in steam and electric car-building plants.

Steel, Repairing. The Fabrication of Steel Car Parts. Ry. Mech. Engr., vol. 100, no. 11, Nov. 1926, pp. 673–675, 6 figs. Description of equipment and some of methods used at L. & N. shops, South Louisville, Ky.

CARS, FREIGHT

Box. Box Car Side Frame Design, R. M. Mochrie. Can. Ry. Club—Official Proc., vol. 25, no. 6, Sept. 1926, pp. 20–31, 4 figs. Wood and steel superstructure; difficulties in design; indefinite forces; oscillation; end shock; longitudinal and centrifugal force; causes of broken members; design of Pratt truss.

CARS, PASSENGER

Water-Heating Systems. The Air Pressure Water and Heating Systems on Sleeping and Passenger Cars, E. L. Goodwin. Car Foremen's Assn.—Official Proc., vol. 20, no. 9, Sept. 1926, pp. 10–42, 3 figs. Water system used on all Pullman cars and also on numerous private, business, dining and passenger cars throughout United States; vapor system of heating.

CASE-HARDENING

Distortion. Predicting the Distortion of Heat-Treated Case-Hardened Rings, P. J. Haler. Engineering, vol. 122, no. 3170, Oct. 15, 1926, pp. 470–471, 2 figs. Points out that one of greatest drawbacks to extended use of case-hardened parts is distortion; presents charts showing maximum and minimum allowance which is to be left in bore of mild-steel work that is to be case-hardened before grinding; local distortion may be caused by unequal heating in furnace or pieces of scale adhering to piece during quenching; various factors help to give rapid cooling, such as high temperature of quenching, etc.

Rotary Machines for. Rotary Machines for Carburizing, F. S. O'Neil. Iron Age, vol. 118, no. 21, Nov. 18, 1926, pp. 1407–1409, 3 figs. Greater uniformity of product reported; cost figures given; advantages from subsidiary uses.

CAST IRON

Elements, Influence of. Some Gray Iron Problems, J. Shaw. Am. Foundrymen's Assn.—Advance Paper, no. 19, for mtg. Sept. 27–Oct. 1, 1926, 41 pp., 34 figs. Considers influence of sulphur and manganese on structure of cast iron containing ordinary amounts of other usual elements; deals with influence of carbon and silicon, in conjunction with other elements in structure; points out usefulness of various chill tests to practical man for judging roughly ultimate structure of molten metal before casting; form of sulphur in cast iron; discusses various views accounting for differences in loss of depth of chill between test pieces and results secured in rolls; effect of ratio of carbon to silicon on structure as judged by chill tests. See also Foundry, vol. 54, nos. 19 and 20, Oct. 1 and 15, 1926, pp. 767–772 and 825–829, 34 figs.

Flake Graphite in. Coarse-Flaked Graphite in Cast Iron (Garschaumgraphit im Gusseisen,) B. Osann. Stahl u. Eisen, vol. 46, no. 39, Sept. 30, 1926, pp. 1320–1324. Formation of graphite flakes with different melting processes; occurrences in special experimental pig-iron charges; influence of temperature and time; prevention of flakes.

Heat and Scale Resistance. Heat and Scale Resisting Cast Iron, O. Smalley. Am. Foundrymen's Assn.—Advance Paper, no. 12, for mtg. Sept. 27–Oct. 1, 1926, 33 pp., 15 figs. Deals with high-duty castings; chilling irons and scale-resisting castings; semi-steel and influences of graphitizers; annealing process for car wheels and reasons for certain wheels giving better test results than others; mechanism of breaking down of ordinary white iron under heat-oxidizing conditions. See also Foundry Trade Jl., vol. 34, nos. 529 and 531, Oct. 7 and 21, 1926, pp. 303–305 and 343–347, 14 figs.

Improvement. Superior Cast-Iron, H. H. Schmidt and Irresberger. Eng. Progress, vol. 7, no. 9, Sept. 1926, pp. 243–245, 8 figs. Pearlite-graphite iron and its properties; improvement of cast iron by jolting and shaking process.

The Desulphurizing of Cast Iron and Its Refinement by Jolting (Bemerkungen zur Entschwefelung des Gusseisens und zu seiner Veredlung durch Rütteln), W. Denecke and T. Meierling. Giesserei-Zeitung, vol. 23, no. 20, Oct. 15, 1926, pp. 569–571. Results of practical investigations show no marked influence of jolting on desulphurizing; but, on other hand, jolting has effect of freeing charges from gases which accelerate formation and diffusion of graphite.

The Production and Improvement of High-Grade Cast Iron (Verfahren zur Verbesserung und zur Erzeugung von hochwertigem Gusseisen), O. Mäurer. Giesserei, vol. 13, no. 39, Sept. 25, 1926, pp. 727–731, 6 figs. Discusses most important methods of refining and production, with special reference to jolting process of J. Dechesne.

Pearlitic. Perlit Cast Iron. Mech. World, vol. 80, no. 2074, Oct. 1, 1926, p. 266. Discusses properties of special cast iron invented in Lanz foundries, Germany; method consists of casting irons of suitable composition in heated molds; points out that absence of really decisive quantitative information makes it difficult to estimate advantages of preheated mold, but they do not appear to be of very great order.

CENTRAL STATIONS

Columbus, Ohio. New Station at Columbus Embodies Many Refinements. Power, vol. 64, no. 20, Nov. 16, 1926, pp. 724–728, 7 figs. Planned for ultimate capacity of 150,000 kw., new Picway station with initial installation of two 30,000-kw. units, is provided with stoker-fired boilers capable of operating up to 450 per cent of rating; motor-driven auxiliaries, bled steam, evaporators, preheaters and economizers are factors in heat balance.

Cost Accounting. Power-Station Accounting for Industrial Plants, W. R. Herod. Mech. Eng., vol. 48, no. 11a, Mid-Nov. 1926, pp. 1347–1357, 11 figs. Particulars of system of procedure that has been employed satisfactorily with but minor modifications for over three years in seven factory plants.

Crawford Ave., Chicago. The Crawford Avenue Station, Chicago, J. B. C. Kershaw. World Power, vol. 6, no. 35, Nov. 1926, pp. 253–258. General features of station; fuel-discharging and distributing equipment; boilers, stoking and ash-handling equipment; turbines and generating units; statistical and other information.

England. Extensions to the Derby Corporation Electricity Works. Engineering, vol. 122, no. 3172, Oct. 29, 1926, pp. 545–547, 10 figs., partly on p. 540. Station now contains one 750-kw. d.c. machine running at 1800 r.p.m.; three 2000-kw., one 4000-kw., one 750-kw. and one 10,000-kw., all a.c. machines and running at 3000 r.p.m.

The Thorpe Power Station of the Norwich Corporation. Engineering, vol. 122, no. 3173, Nov. 5, 1926, pp. 576–578, 2 figs. Boiler house contains four Stirling boilers, two of which are fitted with Underfeed Type A traveling-grate stokers and other two with Erith-Roe retort stokers; chimneys are of steel-plate construction; the two turbo-generator sets were constructed by British Thomson-Houston Co., and are each of 5000-kw. capacity, generating 3-phase current at 6600 volts and 50 cycles frequency.

Germany. The Rummelsburg Central Station of the Berlin Municipal Electrical Works (Grosskraftwerk Rummelsburg der Berliner Städtischen Elektrizitätswerke A.-G.), Przygode. Wärme, vol. 49, no. 27, July 2, 1926, pp. 478–481, 7 figs. Plant is designed for ultimate capacity of 600,000 kw.; details of boiler house and furnaces, steam turbines with condensation, pulverized-coal equipment, etc.

Memphis, Tenn. Fourth Street Station Memphis Light & Power Co. South. Power Jl., vol. 44, no. 11, Nov. 1926, pp. 36–43, 8 figs. Main features of apparatus in new extension to power plant; first step in extension of station's capacity was installation of 15,000-kw. steam turbine generating unit, and four 15,000-sq. ft. 350-lb. pressure boilers, which was followed by installation of 20,000-kw. turbine.

New Smyrna, Florida. New Smyrna, Fla., Light and Power Plant. South. Power Jl., vol. 44, no. 10, Oct. 1926, pp. 57–59, 4 figs. In 1920 two 150-hp. Fairbanks-Morse oil engines were installed; rapidly increasing load which this station has been called upon to carry, necessitated purchase of additional 600-hp. McIntosh & Seymour Diesel engine, Westinghouse generator, motor-generator set and modern 6-panel 90-in. switchboard.

CHAINS

Manufacture. Create Special Chain Department, B. Finney. Iron Age, vol. 118, no. 19, Nov. 4, 1926, pp. 1269–1270, 4 figs. To meet demand for special material without interfering with normal production of standard chain, Diamond Chain & Mfg. Co., Indianapolis, has "Special Department" which functions independently of remainder of plant.

The Development of Chain Making in Europe, M. A. Irmischer. Wire, vol. 1, no. 6, Oct. 1926, pp. 187–189 and 207–210, 9 figs. Review of developments.

CHROME STEEL

Properties. High-Chromium Irons and Steels for Severe Service, T. H. Nelson. Chem. & Met. Eng., vol. 33, no. 10, Oct. 1926, pp. 612–613, 2 figs. Stainless steels have extremely wide range of properties which make them adaptable to unusual problems in chemical and allied industries.

CHUCKS

Indexing. Indexing Chucks for the Turret Lathe. Machy. (N. Y.), vol. 33, no. 3, Nov. 1926, pp. 169–170, 5 figs. Chucks that enable both ends of part to be machined in one operation.

COAL

Carbonization. Economic Side of Low-Temperature Carbonisation, O. J. Parker. Iron & Coal Trades Rev., vol. 113, no. 3056, Sept. 24, 1926, p. 456. Reference to work carried out under direction of R. Delkeskamp, Neubalelsberg, Germany, where there is very complete organization for testing and practical demonstration work, main object being better utilization of non-coking and low-grade coals, both in form of lumpy coal and slack. Abstracted from South Wales Inst. of Engrs.—Proc.

Low Temperature Carbonisation Methods. Chem. Age, vol. 15, no. 380, Oct. 9, 1926, pp. 346–347. Salermo process involves new type of retort which belongs to class of externally heated retorts with continuous feed, material heated undergoing continuous and regular stirring; integral part of process is predrying by means of waste heat of material to be carbonized.

The Low-Temperature Carbonization of Coal, A. C. Fieldner. Mech. Eng., vol. 48, no. 11a, Mid-Nov. 1926, pp. 1217–1227, 16 figs. Statement of fundamental principles involved and brief discussion of present status of representative types of processes.

Carburite. The Refinement of Inferior Fuels, A. Thau. Eng. Progress, vol. 7, no. 9, Sept. 1926, pp. 235–238, 4 figs. Describes carburite process developed by Delkeskamp which improves caloric value and physical qualities of fuel; first stage of refining process is carefully graduated drying during which heat proceeds so slowly through structure, that formation of vapors under pressure in structure of fuel is completely avoided; in second stage of process fuel is exposed to higher temperature by indirect heating in specially designed iron shaft furnace.

Coking Properties. The Coking Properties of Coals, F. Fischer, H. Broche and J. Strauch. Fuel, vol. 5, no. 10, Oct. 1926, pp. 466–475, 12 figs. Experiments show that coals can be deprived of those constituents which determine caking and swelling; it was found that with increasing geological age of coals, content of oily bitumen increases and proportion of solid bitumen diminishes proportionally. Translation from Brennstoff-Chemie, 1925, p. 33.

Distillation. The Distillation of Coal, W. H. Blauvelt. Mech. Eng., vol. 48, no. 11a, Mid-Nov. 1926, pp. 1210–1212. Principles involved in high- and low-temperature processes of carbonizing coal, difference in products obtained therefrom, and fields for each process.

Gasification. Complete Gasification of Bituminous Coal, R. S. McBride. Mech. Eng., vol. 48, no. 11a, Mid-Nov. 1926, pp. 1213–1216. Discussion of fundamental technology and economics of gaseous-fuel supply, dealing with present status and possibilities of systems available for making gas for use in mechanical and chemical-process industries.

Pulverized. See PULVERIZED COAL.

COAL HANDLING

Central Stations. Coal and Ash Handling. Nat. Elec. Light Assn.—Report, no. 26–8, Mar. 1926, 20 pp., 32 figs. Coal and ash-handling developments during year; preparation of low-grade coal for stoker firing; bunker coal spreader; disposal of cinders; practice at various power stations; disposal of refuse in Pittsburgh district; seasonal storage of coal in New England; weathering of coal in storage; manufacturers' statements. Bibliography.

Hoists. New Hydraulic-Electric Coal Hoists at Cardiff. Engineer, vol. 142, no. 3691, Oct. 8, 1926, pp. 385–388, 7 figs. Coal-handling installation is laid out over 900-ft. length of quay wall, which is now served by 5 groups of railway lines; equipped with four 30-ton coal hoists and four 30-ton car traverses; new features of machinery consist mainly in method of lifting car cradle and tipping it and controls both for 3-ton and 6-ton cranes and discharge shoot; these parts of hoists are all worked by hydraulic power, supplied at pressure of 700 lb. per sq. in.; hoist is, however, fitted with electrically operated traveling gear, and traverser is also worked by electric power, both as regards its traveling and tipping motions.

Hydraulic Unloading. Hydraulic Unloading of Coal Trucks for Power Houses, P. Calfas. Indus. Mgmt. (Lond.), vol. 13, no. 10, Oct. 1926, pp. 424–425, 3 figs. System employed at St. Ouen, Paris, on banks of River Seine. Abstract translated from Génie Civil.

Plants. Coal Handling Plant at Liverpool Corporation Electricity Works. Eng. & Boiler House Rev., vol. 40, no. 4, Oct. 1926, pp. 184–186, 1 fig. All coal handling at station is received by rail and deposited into two lines of specially designed reinforced-concrete silos having total capacity of 1000 tons and total length of 225 ft.; arrangement is such that 20-ton steel railway cars can run over and along top of silos and by means of hopper bottoms deposit their contents into silos below; silos feed two belt conveyors by means of traveling chute for each belt.

COAL STORAGE

Bunkers. Reinforced Concrete Coal Bunkers. Eng. & Boiler House Rev., vol. 40, no. 4, Oct. 1926, pp. 176–180, 3 figs. Special reference to 10,000-ton bunker at Greenwich power station of London County Council Tramways Department.

COMPRESSED AIR

Pipe-Line Transmission. Transmission of Compressed Air in Pipe Systems, J. Sarvaas. Chem. Eng. & Min. Rev., vol. 18, no. 216, Sept. 6, 1926, pp. 489–491, 1 fig. Points out that careful consideration should be given to design of pipe systems so that losses may be reduced to minimum.

CONDENSERS, STEAM

Operation. Some Results of Condenser Operation, E. B. Ricketts. Mech. Eng., vol. 48, no. 11a, Mid-Nov. 1926, pp. 1312–1314, 8 figs. Results of year's operation of four condensers differing radically in design, but operated under same water conditions and under same supervision.

Regenerative. A Large Generative Surface Condensing Plant. Engineer, vol. 142, no. 3695, Nov. 5, 1926, pp. 506–508, 6 figs. partly on p. 500. With object of investigating condenser performance in general, G. and J. Weir, Glasgow, caused to be constructed inverted surface condenser with two-pass cooling-water arrangement, air being extracted from top of condenser; steam entered at bottom of condenser, and after passing through first bank of tubes with second pass cooling water, it rose to second or top bank of tubes, which were cooled with first pass water as it entered condenser; noteworthy example of this type was installed in Lister Drive power station of Liverpool Corp. Electricity Department.

Water Distribution. Condenser Study Shows Bad Water Distribution, J. J. Grob and N. Artsayooloff. Power, vol. 64, no. 19, Nov. 9, 1926, pp. 702–705, 6 figs. Studies on one of main condensers in Hell Gate plant indicate that more attention should be given to design of water side of condenser, to secure more uniform distribution among tubes; steam-flow conditions can also be improved.

CONVEYORS

Belt. Extensive Belt Conveyor System for Iron Ore Concentration Plant. Indus. Mgmt. (Lond.), vol. 13, nos. 9 and 10, Sept. and Oct. 1926, pp. 392 and 434, 3 figs. Sept.: Use of belt conveyors in coarse crushing and roll crushing plant. Oct.: Fine grinding plant.

COOLING TOWERS

Types. Recent Cooling Towers (Neuere Kaminkühler), H. F. Lichte. Gas- u. Wasserfach, vol. 69, no. 33, Aug. 14, 1926, pp. 698–703, 8 figs. Describes improved Friederich system, cross-current and counter-current types; Balcke system of cross-counter current coolers; design and operation.

Visco. Water Softening and Cooling Plant. Machy. Market, no. 1352, Oct. 1, 1926, pp. 25–26, 2 figs. Details of Visco chimney-type cooling tower at Cardiff Corp. power station.

COPPER ALLOYS

Copper-Beryllium. The Copper-Beryllium Alloys, M. G. Corson. Brass World, vol. 22, no. 10, Oct. 1926, pp. 314–320, 27 figs. Tests with rare metal show its possibilities as hardening agent for copper; in some proportions product is similar to gold in color; resists tarnishing.

CORES

Binders. Testing of Core Binders (Die Prüfung von Kernbindemitteln), Diepschlag. Giesserei, vol. 13, no. 40, Oct. 2, 1926, pp. 752–754, 5 figs. Results of tests on molasses, linseed oil, sulphite brine, etc., to determine strength and gas permeability and influence of increasing temperature.

COST ACCOUNTING

Textile Industry. Handling Cost Elements in Textile Industry, F. H. Rowland. Textile World, vol. 70, no. 14, Oct. 2, 1926, pp. 55–58, 3 figs. Predetermination of elements and proper classification of them are two essentials; cost analysis must be made currently; why some systems fail; methods suggested for direct labor, materials and burden.

COTTON

Fabrics, Thermal Properties. An Experimental Method for Investigating the Thermal Properties of Cotton Fabrics, J. Gregory. Textile Inst.—Jl., vol. 17, no. 10, Oct. 1926, pp. T553–T566, 11 figs. Study of effect of moisture content of fabric on its transmitting and reflecting powers, etc.

Hair Weight. The Importance of Hair Weight per Centimetre as a Measurable Character of Cotton and Some Indications of its Practical Utility, W. E. Morton. Textile Inst.—Jl., vol. 17, no. 10, Oct. 1926, pp. T537–T552, 4 figs. Demonstrates importance of hair weight per centimeter, both in relation to quality of cottons and also as means of assisting in their identification; more particularly when in form of yarn or fabric.

COTTON MILLS

Power Losses. Power Losses in Cotton Textile Mills, G. Wrigley. Mech. Eng., vol. 48, no. 11, Nov. 1926, pp. 1103–1104, 2 figs. Deals with power losses within mill and suggests difficulties and possibilities of reduction.

CRANK DRIVE

Kinematics Applied to. Kinematics Applied to Dynamics of Crank Drive (Die Getriebekinematik als Rüstzeug der Getriebedynamik), F. Proeger. Forschungsarbeiten, no. 285, 1926, 74 pp., 67 figs. Single- and multiple-crank drives; analysis of machine drives; kinematic basic equation; determination of speeds and accelerations of crank drives; determination of joint pressures in crank drives; equations of motion; numerical example for determination of reduced moments of inertia.

CUPOLAS

Charging. Modern Charging Equipment for Cupolas by Means of Telpher Line (Neuzeitliche Begichtungsanlagen für Kuppelöfen mittels Elektrohängebahn), G. A. Geipel. Stahl u. Eisen, vol. 46, no. 39, Sept. 30, 1926, pp. 1324–1326, 4 figs. Installation built by Henschel & Son, Cassel, Germany, which permits saving in time and labor and does not take up space around cupolas.

Heat Balance. The Heat Balance of a Cupola of the Sulzer Type. Sulzer Tech. Rev., no. 3, 1926, pp. 4–11, 12 figs. Results of series of tests on large scale carried out in foundry at Winterthur, Switzerland; measurement on temperature-air pressure; tests show that correct weight of coke charge is absolutely dependent on dimensions of cupola and especially on its internal diameter; no connection can be found between tensile strength of cast iron and way in which cupola is worked or combustion processes in cupola.

Melting Synthetic Iron. Melting Synthetic Iron in the Cupola, F. Hudson. Foundry, vol. 54, no. 21, Nov. 1, 1926, p. 857. Describes practice in melting metal produced from all-steel charge.

CUTTING METALS

Elements of. A Research in the Elements of Metal Cutting, O. W. Boston. Am. Soc. Mech. Engrs.—advance Paper, for mtg. Dec. 6–9, 1926, 95 pp., 83 figs. Investigation in fundamental elements of metal cutting conducted in Machine Tool Laboratory at University of Michigan; object was to determine relation between force on tool in direction of cut for constant cutting speed of 20 ft. per min., and degrees of tool sharpness, various tool angles, width and depth of cut, and physical properties of materials cut; nine representative types of material were cut including carbon steels, alloy steels, brass and annealed and unannealed cast iron; cutting was confined to straight-line motion on planer and tools used were of end-cutting type; results indicate, among other things, that there is apparent relation between some of physical properties of metal and their machinability or cutting force on tools. Bibliography.

CUTTING TOOLS

Resistance of Metals to. Work-Hardening Properties of Metals, E. G. Herbert. Am. Soc. Mech. Engrs.—Advance Paper, for mtg. Dec. 6–9, 1926, 43 pp., 37 figs. Seeks to bring into correlation with operation of cutting tools certain groups of well established and generally recognized facts, chief among them being: (1) fact that metals are hardened by any process which deforms them so as to cause permanent change of shape while they are at low or moderate temperatures, process generally referred to as cold work; (2) fact that metals are deformed and are therefore hardened by cutting tools; (3) fact that heat is generated by deformation of metals and in preëminent degree by metal-cutting operations; and (4) degree of hardness induced by working metals with cutting tools, or otherwise, is greatly influenced by temperature at which deformation takes place; shows bearing of these correlated facts on resistance offered by metals to cutting tool and on rate of wear of cutting tool.

Rough Turning. Rough Turning with Particular Reference to the Steel-Cut, H. J. French and T. G. Digges. Am. Soc. Mech. Engrs.—Advance Paper, for mtg. Dec. 6–9, 1926, 69 pp., 22 figs. Tests extend to current commercial high-speed tool and structural alloy steels and portions of Taylor's original investigations in rough turning carbon steels; they were made primarily to show effect upon tool performance of variation in chemical composition and mechanical properties of steel cut and include lathe tests on carbon nickel, low- and high-chromium, chromium-vanadium, chromium-molybdenum and nickel-chromium steels having tensile strengths between 65,000 and 195,000 lb. per sq. in.

CYLINDERS

Hollow, Cold Working of. The Strengthening of Hollow Cylinders by Cold-work. Metallurgist (Supp. to Engineer, vol. 142, no. 3694), Oct. 29, 1926, pp. 155–156. Refers to accounts of early development of process as applied to guns, especially of work by Jacob on process known as "autofrettage" or self-shrinkage; points out that magnitude of internal stresses calculated by Jacob is misleading; work of numerous investigators has shown that steel overstrained in tension (as are inside layers of cylinder) has elastic limit in compression diminished; refers to Langenberg's work on effect of cold working on strength of hollow cylinders (Am. Soc. Steel Treating—Trans., 1925, p. 447), emphasizes effect of low-temperature annealing of overstrained cylinder.

D

DIE CASTING

Aluminum and Brass. Aluminum and Brass Spray Castings (Aluminum- und Messing-Spritzguss), G. S. Fritze. Gewerbefleiss, vol. 105, no. 9, Sept. 1926, pp. 189–191, 5 figs. Details of casting machine of American and European types; casting under pressure and its applications; advantages of die casting.

DIES

Bending. Rules for Laying Out Bending Dies. Am. Mach., vol. 65, no. 19, Nov. 4, 1926, p. 773, 7 figs. Development of blanks. Reference-book sheet.

Die-Sinking Machines. Die Sinker Makes Cherrying Cuts Without Special Attachments. Automotive Industries, vol. 55, no. 19, Nov. 4, 1926, pp. 776–777, 4 figs. Also Am. Mach., vol. 65, no. 20, Nov. 11, 1926, pp. 803–804, 2 figs. Oscillating head is feature of new Pratt & Whitney No. 3-A universal machine; ordinary die sinking, without changes in set up, can also be done by binding head; six-spindle speeds are available.

Press. Increasing Life of Dies for Hot Pressing of Brass (Die Erhöhung der Lebensdauer von Gesenken für das Warmpressen von Messing), A. Aronheim. Maschinenbau, vol. 5, no. 19, Oct. 7, 1926, pp. 887–892. Discusses characteristics of drop hammer, hydraulic press, etc., and their effect on dies; choice of suitable steels for dies and their heat treatment; use of hardened nickel-chrome steels.

Wear of Dies and the Steel Problem for Hot Pressing (Gesenkverschleiss und Stahlfrage in der Warmpresserei), W. Spitzner. Maschinenbau, vol. 5, no. 19, Oct. 7, 1926, pp. 880–887, 18 figs. Investigation to determine causes of wear in dies for hot pressing of screws; question of suitable steels for dies; for mass production chrome-nickel and chrome-tungsten steels are recommended, in spite of high cost.

DIESEL ENGINES

Airless-Injection. Compressorless Diesel Motors, H. Meurer. Motorship (Lond.), vol. 7, no. 74, May 1926, pp. 57–59, 10 figs. Analysis of marine oil engines of airless-injection type, with special reference to Deutz motor of this design.

The Sulzer Airless Injection Two-Cycle Engine, Type "RK." Sulzer Tech. Rev., no. 3, 1926, pp. 14–15, 2 figs. New type differing from previous design in that 2, 3 or 4 working cylinders are cast together in single block.

Busch-Sulzer Shipping Board. The Busch-Sulzer Shipping Board Engines. Mar. Eng. & Shipg. Age, vol. 31, no. 10, Oct. 1926, pp. 579–584, 12 figs. Construction details and test results of 6-cylinder, 2-cycle engines designed to develop 300 s.hp. at r.p.m. See also description in Pac. Mar. Rev., vol. 23, no. 10, Oct. 1926, pp. 446–448, 5 figs.

Central Stations. An Economic Problem Solved by Diesel Engines. Power, vol. 64, no. 21, Nov. 23, 1926, pp. 772–773, 1 fig. Three Worthington engines have been installed in power plant of city of Horton, Kan.

Double-Acting. The Krupp Double-Acting Engine. Motorship (Lond.), vol. 7, no. 78, Sept. 1926, pp. 208–209, 4 figs. New 2-stroke 6-cylinder engine of port-scavenging type. Translated from Werft—Reederei—Hafen.

Exhaust Gases. Diesel Engine Gas Observations, M. U. Buchting and G. Dinkela. Blast Furnace & Steel Plant, vol. 14, no. 11, Nov. 1926, pp. 459–460, 2 figs. Measurement of temperature and content of CO_2 and H in Diesel-engine exhaust gases make it possible to determine combustion efficiency.

Fairbanks-Morse. Fairbanks-Morse Building Larger Diesels. Mar. Eng. & Shipg. Age, vol. 31, no. 10, Oct. 1926, pp. 591–597, 12 figs. New units in 480, 600 and 720-hp. sizes; simplicity, sturdiness, compactness and smoothness in running are features.

Large Diesels Built by Fairbanks-Morse. Ry. Age, vol. 81, no. 17, Oct. 23, 1926, p. 772, 1 fig. Two-cycle, single-acting port-scavenging, airless-injection type.

Heavy-Oil. A 600 B.HP. Heavy-Oil Engine. Engineer, vol. 142, no. 3696, Nov. 12, 1926, pp. 532–533, 4 figs. New type of vertical four-stroke-cycle, single-acting heavy-oil engine designed by Belliss & Morcom for industrial and marine auxiliary use.

M.A.N. Acceptance Testing of the 15,000-Hp. Diesel Engine of M.A.N. Type Built for Hamburg Electrical Works by Blohm & Voss (Die Abnahmeprüfung des 15000 PSe-Dieselmotors, Bauart M.A.N), W. Laudahn. Zeit. des Vereines deutscher Ingenieure, vol. 70, no. 43, Oct. 23, 1926, pp. 1409–1411, 3 figs. Experimental program and measuring results of acceptance tests; results were in every way satisfactory and demonstrate adaptability of large Diesel engines for central stations.

The M.A.N. Double-Acting Engine. Motorship (Lond.), vol. 7, no. 73, Apr. 1926, pp. 4–9, 16 figs. 4400-b.hp. 6-cylinder 2-stroke unit; type to be fitted on 31,000-ton quadruple-screw liner, Magdeburg.

Machining Rods and Shafts. Making Rods and Shafts for Diesel Engines. Am. Mach., vol. 65, no. 18, Oct. 28, 1926, pp. 713–714, 6 figs. Methods and equipment of New London Ship & Engine Co., Connecticut.

Polar. Two New Polar-Diesel Engines. Motorship (Lond.), vol. 7, no. 77, Aug. 1926, pp. 179–180, 5 figs. Six-cylinder 2000-b.hp. unit for Sommerstad and five-cylinder 720-b.hp. engine for British-built coaster.

Producer-Tar-Fired. Internal Combustion Engines, M. Jaretzky. Eng. Progress, vol. 7, no. 9, Sept. 1926, pp. 241–242, 4 figs. Maschinenbau A. G. (L. Schwartzkopff), Berlin, Germany, has succeeded in employing lignite tar as fuel for Diesel engine; tar is derived from heating gas required for annealing furnaces; producers equipped with exchangeable retorts; part of gas is sucked from retorts and freed from tar; fuel then drops from retort into gasifying chamber from which hot gas is taken.

Stand-By Service. Large Diesel for Stand-By Service, L. H. Morrison. Power, vol. 64, no. 22, Nov. 30, 1926, pp. 823–824, 3 figs. Where water flow is irregular, oil engines meet stand-by requirements satisfactorily; unless coal be cheap, Diesel's operating costs are lower than of like-sized steam plants.

Supercharging. New Developments in Supercharging. Motorship (Lond.), vol. 7, no. 74, May 1926, p. 61, 1 fig. First installations of superchargers driven by exhaust-gas turbines are being made on two motor passenger ships, Preussen and Hansastadt Danzig, recently launched in Germany; they are equipped with two Vulcan-M.A.N. 4-cycle single acting engines.

Types. A Comparison of Diesel Engines, M. Gercke. Motorship (Lond.), vol. 7, no. 79, Oct. 1926, pp. 250–252. Analysis of characteristics of single and double-acting 4-cycle and 2-cycle Diesel engines.

DRILLING MACHINES

Horizontal. Modern Special Types of Horizontal Drilling and Milling Machines (Neuere Sonderbaurten wagrechter Bohr- und Fräsmaschinen), Weil. Zeit. des Vereines deutscher Ingenieure, vol. 70, no. 42, Oct. 16, 1926, pp. 1393–1395, 6 figs. Details of machines by firm of Schiess-Defries A.-G., Düsseldorf, Germany, including drilling machine for production of large motors, double-spindle drilling machine for making locomotive fireboxes, and universal milling machine.

Piston. "Hole Hog" No. 19 Horizontal Duplex Piston-Drilling Machine. Am. Mach., vol. 65, no. 22, Nov. 25, 1926, p. 885, 1 fig. Built by Moline Tool Co., Moline, Ill., with four standard heads, and jig for drilling wrist-pin holes in automotive pistons.

Multiple. Multiple Drilling Operations on Engine Parts, W. F. Sandmann. Machy. (N. Y.), vol. 33, no. 2, Oct. 1926, pp. 115–117, 7 figs. Machines designed to meet specific drilling requirement, made by National Automatic Tool Co., Richmond, Ind.

DURALUMIN

Corrosion. Duralumin and Its Corrosion, W. Nelson. Aviation, vol. 16, no. 18, Nov. 1, 1926, pp 738–741, 4 figs. Complicity of corrosion problem; factors governing corrosion; corroding mediums; effects of salt atmosphere and of fuel; contact and induced corrosion; corroding solutions.

Properties. Duralumin, L. Aitchison. Flight (Aircraft Engr.), vol. 18, nos. 12, 17, 21, 25, 30, 39 and 43, Mar. 25, Apr. 29, May 27, June 24, July 29, Sept. 30 and Oct. 28, 1926, pp. 178a–178c, 260g–260i, 308g–308h, 362f–362h, 464a–464c, 636a–636c and 702d–702e. Reheating and heat-treating of duralumin. Apr. 19: Tests to determine mechanical properties. May 27: Process of working after quenching; heating prior to quenching; working of salt baths. June 24: Corrosion and its causes. July 29: Hot working of duralumin; preparation of forging. Sept. 30: Discontinuities in duralumin. Oct. 28: Machining of forgings and drop forgings, and extruded and hammered duralumin bars; duralumin tubes; welding.

E

ECONOMIZERS

High-Speed. The Design of High-Speed Economisers, B. M. Thornton. Engineering, vol. 122, no. 3174, Nov. 12, 1926, pp. 592–593, 1 fig. Presents exact, and in author's belief, novel method of economizer design; method was first worked out after consideration of that presented by Maker and Thornburg, in paper before Am. Soc. of Mech. Engrs., 1924, which is particularly suitable for dealing with type of economizer in which high rates of heat transfer are obtained by use of high gas and water velocities; in type of economizer under discussion, water passages should be so designed that water velocity is above upper critical velocity for turbulence at all temperatures and normal rates of working.

EDUCATION, ENGINEERING

Investigation. Summary of the Fact-Gathering Stages of the Investigation of Engineering Education, H. P. Hammond. Eng. Education—Jl., vol. 17, no. 1, Sept. 1926, pp. 52–82, 1 fig. Summary of facts gathered during past two years by Society's Investigation; deals with organization, personnel, supplemen-

tary activities of engineering colleges, research, costs, curricula and degrees.

Teaching Personnel. Engineering Teaching Personnel. Eng. Education—Jl., vol. 17, no. 2, Oct. 1926, pp. 217–261, 7 figs. Study undertaken through statistical means as accurate conception as possible of certain aspects of status of engineering teachers in United States and Canada and upon basis of that information improvement of teaching staffs.

ELECTRIC FURNACES

Combustible Gases, Recovery of. Utilization of Electric-Furnace Gases (Sur le captage des gaz de fours électriques), P. Bunet. Revue Générale de l'Electricité, vol. 20, no. 9, Aug. 28, 1926, pp. 315–321, 6 figs. Author maintains that CO produced as by-product at most electric furnaces operating on reduction principle should not be permitted to escape unused; it is not difficult to arrange cope of furnace in such a way as to catch these combustible gases and to utilize them as direct or motor fuel; manufacture of calcium carbide is taken as example and economies realized if developed gases are caught and used are set forth; similar example is given for electric steel furnace where 30 to 40 per cent of energy required by furnace can be regained from generators driven by gas motors, which operate from exhaust gases of furnace.

Tool Hardening. Lead-Bath Furnace Improves Tool Hardening, J. L. Faden. Elec. World, vol. 88, no. 20, Nov. 13, 1926, p. 1025, 1 fig. Installation of 23-kw. electric furnace for operation on 230-volt single-phase service in tool room of general service buildings of Edison Electric Illuminating Co., Boston, Mass.; outfit has capacity for heating about 150 lb. of steel per hour and consumes from 16 to 18 kw-hr. per hour in this service.

100,000-Ampere. A 100,000-Ampere Electric Furnace. Elec. Rev., vol. 99, no. 2550, Oct. 8, 1926, pp. 597–598, 2 figs. Particulars of single-electrode furnace installed in France.

ELECTRIC LOCOMOTIVES

Freight. New York Central Electric Freight Locomotives, E. B. Katte. Ry. Age, vol. 81, no. 18, Oct. 30, 1926, pp. 845–848, 8 figs. Two-unit locomotive is designed to haul 3000-ton train at 32 miles per hour. See Elec. Ry. Jl., vol. 68, no. 18, Oct. 30, 1926, pp. 796–801, 12 figs.

Italy. The New Three-Phase Electric Locomotives GR.E-472 (Nuovi locomotori elettrici trifasi GR.E-472 a frequenza industriale), Savola. Rivista Tecnica delle Ferrovie Italiane, vol. 30, no. 2, Aug. 15, 1926, pp. 41–44, 1 fig. Built by Breda of Milan for Italian State Railways; motors develop 1350, 1850 and 1950 kw. at speeds of 37.5, 50 and 75 kw.; tractive effort 12,000, 12,000 and 8500 kg., respectively.

Storage-Battery. Unusual Type of Storage Battery Locomotive with Gas-Electric Auxiliary, W. D. Bearce. Gen. Elec. Rev., vol. 29, no. 11, Nov. 1926, pp. 762–764, 3 figs. New switching locomotive made at Erie, Pa., and shipped on its own wheels to Chicago, Ill., arranged for either storage-battery or gas-electric operation, or both.

Switching. This Switching Locomotive is Smokeless. Ry. Rev., vol. 79, no. 15, Oct. 9, 1926, pp. 541–542, 3 figs. Storage-battery switcher with gas-electric auxiliary built for Chicago & Northwestern.

ELECTRIC WELDING

Seam. Electric Seam Welding Applied to Sheet-Metal Work, F. W. Curtis. Am. Mach., vol. 65, no. 21, Nov. 18, 1926, pp. 833–835, 8 figs. Principles of seam-welding machine and procedure to follow in welding different types of work; examples of welding operations; importance of cleaning; knurling rolls for scaling. See also description of machine in Iron Age, vol. 118, no. 21, Nov. 18, 1926, p. 413.

ELECTRIC WELDING, ARC

Hydrogen. Welding with the Atomic Hydrogen Flame, R. A. Weinman. Am. Welding Soc.—Jl., vol. 5, no. 10, Oct. 1926, pp. 69–76, 14 figs. Results attained in research laboratory of General Electric Co. with this process indicate quite clearly that welds can be made by it which cannot be made by any other known means; however, apparatus is hardly out of laboratory stage, and requires further development to suit general commercial conditions.

Stainless Steel. Arc Welding Stainless Steels, W. C. Johnson. Welding Engr., vol. 11, no. 10, Oct. 1926, pp. 35–38, 16 figs. Industrial Welded Products Co. has developed electric welding of chromium irons to high point of perfection, after long period of experimentation and research; it is now possible to make welds in high-chromium low-carbon plate having same chemical analysis as plate itself.

Structural-Steel Joints. Structural Steel Joints Fundamentally Designed for Arc Welded Connections, A. M. Candy. Am. Welding Soc.—Jl., vol. 5, no. 10, Oct. 1926, pp. 76–92, 12 figs. Design of test specimens, and design for welded steel building for Westinghouse Electric & Mfg. Co. at Sharon, Pa.; testing work was carried on at Carnegie Inst. of Technology.

ELECTRIC WELDING, RESISTANCE

Seams. Welding Tight Seams Quickly. Welding Engr., vol. 11, no. 10, Oct. 1926, pp. 55–56, 6 figs. Team work between resistance seam welder and spot welder speeds up production program of electric-dishwasher factory.

ELEVATORS

Controllers. Operation of Semi-Magnet Type Elevator Controllers, C. A. Armstrong. Power, vol. 64, no. 19. Nov. 9, 1926, pp. 693–696, 6 figs. Explains difference between semi-magnet and full-magnet types and operation and circuits of three semi-magnet type controllers.

EMPLOYMENT MANAGEMENT

Personnel Managers. An Interest Test for Personnel Managers, E. K. Strong, Jr. Personnel Research—Jl., vol. 5, no. 5, Sept. 1926, pp. 194–203, 3 figs. Vocational selection; compares interests of personnel managers with those of large number of men in various other occupations and uses these comparisons to devise scoring method which discovers how well person's interests conform to those of personnel managers.

Women Workers. Personnel Methods for Women Workers That Paid in 460 Plants, R. J. Waldo. Mfg. Industries, vol. 12, no. 5, Nov. 1926, pp. 371–374, 1 fig. Discusses methods of companies which have shown special activity in their work with girls.

Worker Analysis. Worker Analysis, M. Freyd. Indus. Mgmt. (N. Y.), vol. 72, no. 5, Nov. 1926, pp. 278–282. Points out that it is important for interviewer to have analysis of work before attempting to find best adjustment of man and job; topics for man analysis; analysis of abilities; innate and acquired abilities; general and specific abilities; relative importance of abilities.

ENGINEERS

Graduates and Non-Graduates. Engineering Graduates and Non-Graduate Former Students. Eng. Education—Jl., vol. 17, no. 2, Oct. 1926, pp. 172–216, 10 figs. Study undertaken to obtain information regarding careers of engineering graduates and relationship of their work to courses pursued in college; to determine means through which they obtain first positions; information regarding their early experiences and adjustments to industrial life; and to obtain their opinions regarding various phases of engineering education.

Training. How Should an Engineer Be Trained? T. Morison. North-East Coast Instn. Engrs. & Shipbldrs.—Advance Paper, Oct. 29, 1926, pp. 17–24. Three stages in training of engineer, (1) workshop experience, (2) scientific education in univeristy or technical college, (3) practical training under commercial conditions; training of exceptional apprentice.

EXPLOSIONS

Gaseous. Explosive Reactions Considered Generally, W. E. Garner. Faraday Soc.—Trans., vol. 22, no. 69, Oct. 1926, pp. 253–266, 3 figs. Factors operating in gaseous explosions; temperatures of combustion and specific heat of gases; speed of chemical reaction; ignition temperatures and period of pre-flame; propagation of flame; uniform movement of flame; limits of inflammability; detonation wave; chemical kinetics and catalysis in gaseous explosions. Bibliography.

Radiation in Gaseous Explosions, W. T. David. Faraday Soc.—Trans., vol. 22, no. 69, Oct. 1926, pp. 273–280, 6 figs. Experiments made upon emission of radiation from exploded gaseous mixtures contained in closed vessel, which throw light upon nature and origin of emitted radiation; and experiments showing effect of introducing infra-red radiation into inflammable gaseous mixtures containing nitrogen upon their rate of combustion.

F

FANS

Efficiency. The Efficiency of a Fan, J. W. Whitaker. Colliery Guardian, vol. 132, nos. 3434 and 3435, Oct. 22 and 29, 1926, pp. 883–884 and 938–939, 5 figs. System of energy losses in Sirocco fan, driven by electric motor; efficiency of fan may be found by taking facing water-gage reading and temperatures of air at outlet of fan, temperatures being read to 0.01 deg. cent., or 0.02 deg. fahr.

Induced-Draft. Calculation of an Induced-Draft Fan (Berechnung eines Saugzug-Ventilators), E. Gronwald. Wärme, vol. 49, no. 29, July 16, 1926, pp. 509–514, 4 figs. Gas velocities within fan, static, dynamic and total pressure; blade angle; speed and efficiency; diameter and width of wheel; power consumption.

FATIGUE

Industrial. Monotony in Repetitive Operations, L. M. Gilbreth. Iron Age, vol. 118, no. 20, Nov. 11, 1926, p. 1344. Author claims that unnecessary fatigue in routine productive jobs may be avoided by scientific study of human elements involved.

FEEDWATER HEATERS

Locomotive. Fuel Consumption Cut Seventeen Per Cent. Ry. Rev., vol. 79, no. 14, Oct. 2, 1926, pp. 491–496, 11 figs. Reduction in fuel consumption is attributed to use of Dabeg feedwater heater, which was applied to Consolidation-type freight locomotive; heater consists of combination open-type water preheater with automatic mechanically driven boiler feed pump; it is manufactured under patent rights in Austria where more than 300 of them are in service on Austrian Federal Railways.

FIRE EXTINGUISHERS

Fire-Snow. The Fire-Snow Fire Extinguisher. Engineering, vol. 122, no. 3174, Nov. 12, 1926, p. 616. Preparation, Fire Snow, is dense froth or foam having adhesive properties of natural snow, and formed of minute bubbles containing CO_2; clinging properties of foam cause it to cover ignited surfaces with fireproof layer; foam is produced by combination of two substances, nature of which was not disclosed, dissolved in water; results of tests.

FLIGHT

Stalled. Stalled Flying, S. S. Hall. Roy. Aeronautical Soc.—Jl., vol. 30, no. 190, Oct. 1926, pp. 612–614. Points out that there are two separate types of stall: the first, which is very rare, is due to longitudinal instability, and gives rise to sudden forward dive; second form, which is very common and responsible for two-thirds of fatal air accidents, is known as incipient spin.

FLOW METERS

Electrically Operated. An Electrically-Operated Flow Meter. Engineer, vol. 142, no. 3695, Nov. 5, 1926, pp. 504–505, 4 figs. Meter for indicating, recording or integrating rate of flow of steam, water, air, gas or other fluid, made by Brown Instrument Co., Philadelphia.

FLOW OF AIR

Static-Pressure Measurement. Measurement of Static Pressure, C. J. Fechheimer. Am. Soc. Mech. Engrs.—Advance Paper, for mtg. Dec. 6–9, 1926, 10 pp., 8 figs. Describes new instrument for measuring static pressures in air-flow determinations; made in form of concentric brass tubes, outer of which is $^1/_4$ in. diameter, instrument is easily introduced into air ducts through small openings, such as bolt hole; pressure is communicated to manometers through two holes; it has less error in turbulent flow than other types.

FLOW OF FLUIDS

Pipes. Fluid Flow in Pipes of Annular Cross-Section, D. H. Atherton. Mech. Eng., vol. 48, no. 11, Nov. 1926, pp. 1112–1114, 8 figs. Investigations to determine actual values of friction coefficients for flow of air, oil and water through pipes of annular cross-section; apparatus and method of testing and data and results of tests are given in graphic and tabular form; it appears that coefficient of friction corresponding to any given turbulence factor for both turbulent and viscous flow has value for pipe of annular cross-section slightly higher than for pipes of circular cross-section when determined by equivalent-diameter formula.

Turbulence. Theory of Turbulent Flow in Pipes (Betrachtungen zur Theorie der turbulenten Strömung in Röhren), A. Pröll. Zeit. für technische Physik, no. 9, 1926, pp. 428–434, 3 figs. Deduces equations showing connection between coefficient of resistance and Reynold's number for turbulence theory on basis of Lorenz's ideas; their application to velocity distribution proposed by Mohorovičić.

FLOW OF LIQUIDS

Capillaries. The Flow of Liquids Through Capillaries, N. E. Dorsey. Phys. Rev., vol. 28, no. 4, Oct. 1926, pp. 833–845, 1 fig. Develops simple theory of flow of liquid from reservoir, through capillary into second reservoir; conclusions from it are shown to accord with observations of Bond and Poiseuille, and with qualitative study of flow by means of colored streams.

Orifice. Orifice Flow as Affected by Viscosity and Capillarity, H. W. Swift. Lond., Edinburgh, and Dublin Philosophical Mag., vol. 2, no. 10, Oct. 1926, pp. 852–875, 6 figs. Criteria governing discharge; ideal liquid; effect of surface tension; and of variations in head; effect of viscosity.

FLOW OF WATER

Measurement. Present State of Measuring Flow of Water (Cenni sullo stato attuale della tecnica delle misure di portata), A. Melli. Annali dei Lavori Pubblici, vol. 64, no. 7, July 1926, pp. 580–612, 21 figs. Describes new types of hydrometric propellers, measuring flow in open channels by means of torchometers, weirs, salt, or chemicals, etc.; measuring flow in pressure conduits, distribution of velocity in cross-section, venturi meters, etc.

FLUE-GAS ANALYSIS

CO_2 and CO Recorders. The Control of Flue Gases by Means of Carbon Dioxide Recorders, J. Grant. Indus. Chem., vol. 2 no. 21, Oct. 1926, pp. 433–436, 5 figs. Instruments which measure chemical composition of flue gases and changes in physical property of flue gases.

FLYING BOATS

Rohrbach. Wing Loading and World's Records. Flight, vol. 18, no. 42, Oct. 21, 1926, pp. 686–687, 5 figs. In view of controversy which arose out of accident to Sikorsky machine concerning possibility of getting machine to take off with wing loading of 21 lbs. per sq. ft., it is pointed out that German flying boat with very heavy wing loading not only succeeded in getting off water, but actually beat five world records; this machine was Rohrbach Ro. VII, Robbe, fitted with two B. M. W. engines of 230 hp. each.

FLYWHEELS

Balancing. Balancing Flywheels on a Ball, M. R. Wells. Machy. (N. Y.), vol. 33, no. 2, Oct. 1926, pp. 126–128, 5 figs. Author first made a simple adapter fitted with pointer, by means of which fan assembly could be hung on sharp pointed support, and then redesigned it so that load was supported by steel ball, resting on hardened and flat end of central post; method of checking balance; analysis of balancing principle. See also Machy. (Lond.), vol. 29, no. 732, Oct. 21, 1926, pp. 73–75, 5 figs.

Machining. How Lincoln Flywheels are Machined. Machy. (N. Y.), vol. 33, no. 2, Oct. 1926, pp. 94–96, 7 figs. Flywheel for Lincoln car is finished all over from rough in 5 minutes floor-to-floor time, by 4 machines with 2 men; 3 of machines used are Simplimatics built by Gisholt Machine Co., Madison, Wis., and other is Lodge & Shipley 24-in. engine lathe which is employed for finishing inside of rim in fourth operation.

Machining Flywheels and Clutch Members. Automobile Engr., vol. 16, no. 220, Oct. 1926, pp. 379–381

4 figs. New Machines for high output at Coventry Climax Works.

Machining of Flywheels. Machy. (Lond.), vol. 29, no. 735, Nov. 11, 1926, pp. 166–167, 2 figs. Details of flywheel turning, boring and bossing lathe made by Butler Machine Tool Co., Halifax.

Moments of Inertia. The Estimation of Moments of Inertia of Flywheels, P. F. Poster. Machy. (Lond.), vol. 29, no. 733, Oct. 28, 1926, pp. 105–107, 7 figs. Investigation of application of direct and indirect processes.

FORGING

Upset Process. Forging by the Upset Process, J. C. Kielman. Am. Soc. Steel Treating—Trans., vol. 10, no. 4, Oct. 1926, pp. 599–614, 11 figs. Deals with forgings used in manufacture of ball bearings; discusses steel and its peculiarities, and method of forging it; explanation of upsetting process and advantages of method compared with other methods; problems of forging dies and steels used in making them, and importance of heat treatment of tools; furnaces used for upset forging.

FOUNDRIES

Materials Handling. Determining and Reducing Cost of Materials Handling in Iron Foundries (Die Förderkosten in Eisengiessereien und die Möglichkeiten ihrer Verringerung), K. Hoffmeister. Fördertechnik u. Frachtverkehr, vol. 19, nos. 8, 9, 10, 11 and 12, Apr. 16, 30, May 14, 28 and June 11, 1926, pp. 109–114, 131–134, 144–146, 165–167 and 180–182, 13 figs. Discusses costs of materials handling and how to determine them; cost and upkeep of conveyors, cranes, etc.; cost of materials handling in relation to cost of production; reducing cost by suitable machinery, overhead cableways, etc.; comparison of costs with variation in production.

Production Planning. Distribution of Work in the Foundry (Arbeitverteilung in der Giesserei), B. Schmidt. Giesserei, vol. 13, no. 40, Oct. 2, 1926, pp. 747–752. Author's discussion is inspired by court judgment in Hamburg, stating that it is duty of manufacturer so to organize and manage his plant that he can fill orders in term agreed upon; duties of organizer are classified as follows: work statistics; information service—production plan; distribution of work—execution of production plan; preparation of work.

Progress. Fifty Years of Foundry Progress, S. G. Smith. Foundry Trade Jl., vol. 34, no. 531, Oct. 21, 1926, pp. 349–352. Survey of author's experience touches upon phases of work that have made some advancement in recent years; status of foundryman; methods of molding and modern appliances; drying and baking stoves; melting; progress in use of metal; pouring temperatures, heat treatment and alloying; research work.

Steel. The Steel Foundry, H. M. Boylston. Fuels & Furnaces, vol. 4, no. 10, Oct. 1926, pp. 1179–1186, 4 figs. Discussion of molding, molding sands, molding machines and processes used in steel foundry; specifications; physical properties, defects of steel castings and their remedy.

FOUNDRY EQUIPMENT

Flasks. Standards for Flasks Needed, H. M. Ramp. Iron Age, vol. 118, no. 20, Nov. 11, 1926, pp. 1335–1337, 8 figs. Standard dimensions recommended for cast-iron and cast-steel flasks with design covering pins, pin lugs, handles, flanges, trunnions and bars.

London Show. The International Foundry Exhibition in London (Die Internationale Giessereifachausstellung in London), U. Lohse. Giesserei, vol. 13, no. 42, Oct. 16, 1926, pp. 793–805, 37 figs. Review of exhibits by about 70 firms; in machine department exhibits were confined principally to molding and sand-dressing machines; in metallurgical department, results of English research institutes were demonstrated; foundry raw materials; melting and drying ovens, refractories, and molding sand; concludes that in England as elsewhere, no outstanding progress has been made in cupola design in last 100 years.

Sand-Dressing Plant. Renovating Foundry Sand. Engineer, vol. 142, no. 3692, Oct. 15, 1926, p. 426, 3 figs. French sand-preparing plant which is intended for reconditioning green sand used in foundry and avoiding expense so frequently incurred in scrapping sand, which has been used in molds once and replacing it by new sand.

FREIGHT HANDLING

Perishable Freight. Perishable Freight, H. F. Prince. Central Ry. Club—Official Proc., vol. 34, no. 4, Oct. 1926, pp. 2121–2142, 16 figs. Importance of proper methods of loading and handling at terminals.

FRICTION

Elastic Range. The Elastic Range of Friction, J. S. Rankin. Lond., Edinburgh and Dublin Philosophical Mag., vol. 2, no. 10, Oct. 1926, pp. 805–816, 6 figs. Reference is made to paper on molecular contact by J. S. Stevens, where it is shown, by interferometer method, that in ordinary experiment for finding coefficients of friction, elastic strains are produced before slipping occurs; describes apparatus for measuring this elastic range of friction by using Whiddington's oscillating valve ultramicrometer method; results are given for steel resting on cast iron, and elastic range and yield point for friction are clearly shown.

FUELS

Automotive. See AUTOMOTIVE FUELS.

Calorific Value. Calorific Value (Der Heizwert), F. Merkel. Zeit. des Vereines deutscher Ingenieure, vol. 70, no. 41, Oct. 9, 1926, pp. 1337–1343, 5 figs. Calorific value under different conditions; maximum and minimum value; calorific value in numerical treatment of combustion processes; aspects for choosing upper or lower value.

The Calorific Values of Fuels. Engineering, vol. 122, no. 3176, Nov. 26, 1926, p. 678. In England and most other countries, it is customary to base calculation of thermal efficiency on gross calorific value; new rules for acceptance trials of Verein deutscher Ingenieure, tentatively adopted in 1925, made matter of net or gross value optional; in paper published in Oct. 9 issue of journal of Verein, F. Merkel argues in favor of not abandoning net (lower) value.

Coal. See COAL; PULVERIZED COAL.

Oil. See OIL FUEL.

Pulverized Coal. See PULVERIZED COAL.

FURNACES, ANNEALING

Waste-Heat Recovery. Waste Gases from Annealing Furnaces, C. H. S. Tupholme. Iron & Coal Trades Rev., vol. 113, no. 3060, Oct. 22, 1926, p. 617, 2 figs. Waste-heat boiler was installed by Sulzer Bros. at works of Swiss Trading Co., Neuhausen, for recovery of heat and its use for raising high-pressure steam.

FURNACES, HEAT-TREATING

Gas-Fired. Gas in an Automobile Plant, C. H. Lekberg. Am. Gas Jl., vol. 125, no. 22, Oct. 30, 1926, pp. 539–544. Describes continuous heat-treatment furnaces in Studebaker plant, South Bend, Ind.; carbonizing furnaces; hardening furnaces; burners.

FURNACES, INDUSTRIAL

Oil-Burning. Piping Systems for Oil-Burning Furnaces, C. C. Hermann. Machy. (N. Y.) vol. 33, no. 3, Nov. 1926, pp. 201–203, 4 figs. Analyzing average complaint of given industry using present-day oils, it is generally found that entire trouble is due to lack of recirculation of oil; shows how objectionable features of dead-end system have been eliminated by utilization of recirculation of oil.

G

GAGES

Checking. Centralized Gage Checking Department, G. C. Reilley. Machy. (N. Y.), vol. 33, no. 3, Nov. 1926, pp. 172–175, 8 figs. System employed to insure accurate gages in large plant which uses more than 20,000 pin gages alone.

GAS ENGINES

Combustion in. Combustion in Gas-Engines, W. T. David. Faraday Soc.—Trans., vol. 22, no. 69, Oct. 1926, pp. 341–351, 6 figs. Extent to which incomplete combustion affects pressures developed in gas engines; factors influencing rate of combustion.

Piston Friction. The Pressure Between the Piston and Cylinder Wall in the Gas and Petrol Engine, S. J. Ellis. World Power, vol. 6, no. 35, Nov. 1926, pp. 259–261, 2 figs. Discusses two particular cases, that of gas engine running at 260 r.p.m. with slipper piston and connecting-rod crank ratio of 5 to 1, and gasoline engine running at 2200 r.p.m. with connecting-rod crank ratio of 4 to 1.

GASES

Temperature-Entropy Diagram. Temperature-Entropy Diagram for Air and the Diatomic Gases O_2, N_2, and CO, H. A. Everett. Mech. Eng., vol. 48, no. 11a, Mid-Nov. 1926, pp. 1329–1332, 3 figs. Diagram has been prepared for group of gases for temperature range from 500 to 5500 deg. fahr. abs.; this permits ready solution of problems dealing with these gases where high temperatures are involved without necessity of employing involved or indirect mathematical solutions that take account of variability of specific heats; examples of its use in solution of problems in adiabatic compression and internal-combustion-engine ideal cycles.

GASOLINE

Properties. Testing the Properties in Gasoline, A. P. Bjerregaard. Oil & Gas Jl., vol. 25, no. 9, July 22, 1926, pp. 32 and 137, 1 fig. Physical and chemical properties of gasoline in relation to its use in engine and in relation to preparation of sepcifications; deals with gravity, color, volatility and corrosion.

GEARS

Dynamic Tooth Compensation. Dynamic Compensation of Gear Drives (Dynamischer Ausgleich von Zahnrädergetrieben), H. Hofer. Zeit. des Vereines deutscher Ingenieure, vol. 70, no. 44, Oct. 30, 1926, pp. 1460–1462, 6 figs. Elimination of dynamic errors of gears by means of a new tooth arrangement, which is a step in direction of noiseless gears.

Pin. Pin Gearing, L. E. King. Machy. (N. Y.), vol. 33, nos. 1 and 2, Sept. and Oct. 1926, pp. 35–37 and 111–114, 5 figs., Sept.: Relation of involute and cycloidal gearing to pin gearing as applied in watch and clock mechanisms. Oct.: Methods of laying out; advantages for watch and clock mechanisms.

Pinion Cutting. Pinions Cut from Enlarged Blanks, R. S. Condon. Machy. (N. Y.), vol. 33, no. 3, Nov. 1926, pp. 192–195, 5 figs. Increased strength of enlarged pinions and data for establishing blank sizes; question of tooth interference; effect on base-circle radius; maximum amount pinion blank can be made oversize; cutting oversize gears.

Pump. "Roloid" Pump Gears. Mech. World, vol. 80, no. 2074, Oct. 1, 1926, pp. 260, 3 figs. In order to effect maximum delivery for pump of overall dimensions, teeth should be as large as possible so that space between teeth may have large volumetric capacity; radical departure from ordinary design of pump-gear teeth has been made by David Brown & Sons, by introduction of new form of pump gear known as Roloid gear; profile differs from ordinary involute teeth in that undercutting is eliminated, while number of teeth is reduced to minimum; overlap of tooth contact is reduced to minimum.

Speed Reducers. James Continuous-Tooth Herringbone Speed Reducers. Am. Mach., vol. 65, no. 22, Nov. 25, 1926, p. 887, 1 fig. Herringbone gear developed by James Manufacturing Co., Chicago, Ill., for use in speed-reducing units; this type of gear embodies double helical principle, and as a result is similar in appearance to joining of two single helical gears having opposed helix angles; each individual tooth is brought to an apex and has shape of completed V.

Spur. Proposed Standard for Spur-Gear Tooth Form. Mech. Eng., vol. 48, no. 11, Nov. 1926, pp. 1157–1158, 5 figs. Proposed standard represents present practice for $14^1/_2$ deg. full-depth.

Teeth, Strength of. The Strength of Gear Teeth, S. Timoshenko and R. V. Baud. Mech. Eng., vol. 48, no. 11, Nov. 1926, pp. 1105–1109, 11 figs. Discusses stresses in and deflections of gear teeth; by using photoelastic method stress concentration at tooth root has been studied and factors thereof established for various radii of fillet; local stresses at surface of contact of two teeth in mesh, using Herz theory; it is shown that most unfavorable conditions are found at some depth beneath surface of contact; equations for calculating deflection of teeth; this deflection is shown to be usually less than inaccuracies in commercial gears.

Tooth-Caliper Settings. A Quick Method for Obtaining Gear Tooth Caliper Settings, H. Walker. Machy. (London), vol. 29, no. 730, Oct. 7, 1926, p. 17, 1 fig. Usual method of measuring size of gear tooth is by means of calipers placed across tooth; points of calipers touch tooth profiles where latter are intersected by pitch line; gives close approximate method for obtaining correction for height of arc which renders reference to such tables unnecessary.

Tooth Form. Helical and Spur Gearing. Elec. Traction, vol. 2, no. 10, Oct. 1926, p. 538. Abstract of report of committee of American Elec. Ry. Assn. Consideration of tooth form and limit of wear gages recommends that discard gages for helical gearing and for spur gearing be approved as recommended standards.

Tooth-Spacing Tester. Gleason Tooth-Spacing Tester. Machy. (N. Y.), vol. 33, no. 3, Nov. 1926, p. 230, 2 figs. Gears of any type can be conveniently checked for accuracy of tooth spacing by means of tester now being placed on market by Gleason Works, Rochester, N. Y., which is equipped with optimeter, an optical device having scale graduated to 0.00005 in.

GRINDING MACHINES

Cam. Keller Duplex Cam Grinding Machine. Am. Mach., vol. 65, no. 17, Oct. 21, 1926, p. 691, 2 figs. Machine is intended to grind hardened surfaces of cams of both barrel and flat types.

Centerless. German Centreless Grinding Machines, G. Tuxhorn. Eng. Progress, vol. 7, no. 9, Sept. 1926, pp. 251–252, 5 figs. Machines built by Herminghausen-Kaeferle-Werke, Hannover are primarily intended for grinding wooden rods, galalith and rubber rods, steel bolts and small shafts, and for grinding and polishing brass, iron and steel tubes.

Surface. Hanchett Surface Grinding Machine. Machy. (N. Y.), vol. 33, no. 3, Nov. 1926, p. 223, 1 fig. Machine is equipped with 220-in. O.S. Walker magnetic chuck and is primarily designed for grinding locomotive guide bars, shear blades and similar long work having flat surfaces or edges to be ground.

Tool and Cutter. Norton Improved Universal Tool and Cutter Grinding Machine. Am. Mach., vol. 65, no. 22, Nov. 25, 1926, pp. 883–884, 3 figs. Individual motor drive has been adapted for each operating unit by building motor directly into that unit.

H

HEAT TRANSMISSION

Condensers and Water Heaters. Heat Transmission From Condensing Steam to Water in Surface Condensers and Feedwater Heaters, W. H. McAdams, T. K. Sherwood and R. L. Turner. Am. Soc. Mech. Engrs.—Advance Paper, for mtg. Dec. 6–9, 1926, 28 pp., 17 figs. New experimental data for single-tube water heaters supplied with exhaust steam; equation previously publish d for heat transfer on water side is found to be satisfactory for vacuum condensers and exhaust heaters, although it was found that this equation gave unduly conservative results, discrepancy increasing with increase in steam pressure; this complication is of minor importance.

Measurement. Methods That Have Been and Are Being Used for Measuring Heat Transmission, F. G. Hechler. Mech. Eng., vol. 48, no. 11a, Mid-Nov. 1926, pp. 1337–1343, 5 figs. Review of more important methods that have been used for measuring heat transmission for building and insulating materials, and discussion of their sources of error and probable accuracy. Bibliography.

Moving Air to Tubes. Heat Transfer from Flowing Air to Tubes and Tube Nests, H. Reiher. Mech. Eng., vol. 48, no. 11, Nov. 1926, pp. 1155–1156. Investigation deals with heat transfer when direction of flow of air is normal to axis of tubes and, specifically with determination of coefficient of heat transfer between hot air and tubes and tube nests through which water is flowing, under various arrangements of artificially established convection. (Abstract.) Translated from Forschungsarbeiten, no. 269, 1925.

Refractories. Status of Heat-Transmission Data and Knowledge in the Refractory Field, P. Nicholls. Mech. Eng., vol. 48, no. 11a, Mid-Nov. 1926, pp. 1307–1311. Requirements of practical engineering; data available for engineering problems and review of literature therefor; conclusions from analyses. Bibliography.

HEATING, STEAM

Central. World's Largest Boilers at Beacon Street Heating Plant, J. H. Walker. Power, vol. 64, no. 21, Nov. 23, 1926, pp. 762–765, 5 figs. This station will ultimately contain 12 great boilers, having nearly an acre of steam-making surface and exceeding in size any boiler heretofore constructed; unusual features include water-treating system of zeolite type, special monorail coal-handling system and tandem turbogenerator to maintain heat balance.

Combined Power and Heat. Heating with Steam from the Engine (Heizen mit Maschinendampf), E. de Grahl. Gesundheits-Ingenieur, vol. 49, no. 37, Sept. 11, 1926, pp. 566–571, 21 figs. Discusses Rankine cycle, balance between power steam and exhaust steam, reaction engines, bleeder engines and combinations of both; steam consumption and pressures.

HYDRAULIC TURBINES

Draft Tubes. Turbine Draft Tubes (Ueber Turbinensaugrohre), H. Baudisch. Dinglers Polytechnisches Jl., vol. 341, no. 15, Aug. 1926, pp. 165–167, 2 figs. Deals with design of draft tubes for hydraulic turbines with dynamic and with static transmission of energy.

Efficiency. Efficiency of Hydraulic Turbines (Vom Wirkungsgrad der Wasserturbinen), A. Pfau. Schweitzerische Bauzeitung, vol. 88, no. 13, Sept. 25, 1926, pp. 179–181, 3 figs. Discusses commercial as opposed to technical efficiency, and how to calculate it for various types of turbines; also causes of interruptions in running.

Friction Brakes. Friction Brakes Used on Hydraulic Turbines. Power Plant Eng., vol. 30, no. 21, Nov. 1, 1926, p. 1153, 1 fig. Friction brakes for both vertical and horizontal waterwheel generators are being built in Germany and installed in several hydroelectric plants. Translated from Zeit. des Vereines deutscher Ingenieure.

High-Specific-Speed. European High Specific Speed Hydraulic Turbines, M. P. O'Brien and M. J. Zucrow. Power Plant Eng., vol. 20, no. 21, Nov. 1, 1926, pp. 1166–1170, 8 figs. Several types of propeller runners have been developed by European manufacturers to meet low-head conditions.

Water Velocities in. Water Velocities in Hydraulic Turbine Plants, J. S. Carpenter. Power Plant Eng., vol. 30, no. 22, Nov. 15, 1926, pp. 1210–1211. In designing new plants and rebuilding old ones, water velocities affect pipe lines, sizes, scroll cases and draft tubes, and speed regulation.

HYDROELECTRIC PLANTS

California. Another Low-Head Plant for California—Exchequer Utilizes Irrigation Waters, A. A. Blakesley. Indus. & Eng. Chem., vol. 18, no. 10, Oct. 1926, pp. 232–237, 11 figs. Details of Exchequer project of Merced Irrigation District; dam is gravity structure arched in plan on radius of 674 ft.; construction involved many difficulties because dam is located in narrow canyon which is also occupied by Yosemite Valley Railroad; details of hydraulic and electrical equipment.

Ontario. Norman Dam Hydro Power Development, S. T. McCavour. Can. Engr., vol. 51, no. 17, Oct. 26, 1926, pp. 583–585, 6 figs. Construction of power house by Backus-Brooks Co., at Western outlet of Lake of the Woods; installation will consist of five 3300-kva. generators with provision for seven units.

Rack Cleaning. Improved Rack-Cleaning Methods in Rheinfelden Power Plant (Verbesserte Rechenreinigung in Kraftwerk Rheinfelden), R. Haas and S. Bitterli. Zeit. des Vereines deutscher Ingenieure, vol. 70, no. 45, Nov. 6, 1926, pp. 1483–1485, 9 figs. Details of new equipment which saves nine-tenths of labor required heretofore and eliminates head losses amounting to 2 million kw-hr.

Rack-Cleaning Machine of Voith Design (Rechenreinigungsmaschine, Bauart Voith). Zeit. des Vereines deutscher Ingenieure, vol. 70, no. 45, Nov. 6, 1926, pp. 1485–1486, 3 figs. Describes type of machine with which number of German hydroelectric plants have been equipped in past few years.

I

ICE PLANTS

Diesel Engines in. Cutting Power Costs in Ice and Refrigerating Plants, H. R. Bacon. Ice & Refrigeration, vol. 71, no. 4, Oct. 1926, pp. 215–218, 6 figs. Improvements in Diesel engines show decided economies; fuel consumption in terms of plant capacity; lubricating-oil consumption; estimate of what Diesel power will cost to give dependable service over long period.

INDUSTRIAL MANAGEMENT

Administration Policies. Top Control, J. H. Williams. Taylor Soc.—Bul., vol. 11, no. 4, Oct. 1926, pp. 199–206. Ways and means of making managerial policies effective.

Bibliography. Nucleus of a Management Library. Taylor Soc.—Bul., vol. 11, no. 4, Oct. 1926, pp. 224–230. With emphasis on scientific management.

Budgeting. The Break-Even-Point Chart Analysis, F. J. Reuter. Mfg. Industries, vol. 12, no. 5, Nov. 1926, pp. 367–369, 5 figs. Analysis of typical break-even-point chart used for budgeting and reporting in yeast factory.

Design Division. The Functions of the Design Division in a Technical Organization, J. F. Hardecker. Am. Mach., vol. 65, no. 17, Oct. 21, 1926, pp. 663–666, 6 figs. Scope of each unit of this division; scheduling of work and progress of job from its inception to issuance of final blueprints; use of forms.

Fatigue. See FATIGUE.

Inventory Control. A Simple Inventory Control for the Plant of Moderate Size, B. Klugkist. Factory, vol. 37, no. 5, Nov. 1926, pp. 818, 874 and 942. Accurate knowledge of inventories is usually best gained through perpetual inventories of standard costs; author's method based on same principle, is simple and inexpensive solution of problem.

Laws. Laws of Manufacturing Management, L. P. Alford. Am. Soc. Mech Engrs.—Advance Paper, for mtg. Dec. 6–9, 1926, 28 pp. Discusses laws of management in general; states that principles of management have been discussed but not generally accepted; investigation is limited to manufacturing management; sets forth 43 laws of management with supporting citations.

Marketing. Progress Towards Science in Marketing, W. E. Freeland. Taylor Soc.—Bul., vol. 11, no. 4, Oct. 1926, pp. 207–213. Application of scientific method in sales research, organization, budgets and operations, physical distribution and advertising.

Motion Study. See MOTION STUDY.

Planning. An Interpretation of a German View of Scientific Management, H. A. Hopf. Taylor Soc.—Bul., vol. 11, no. 4, Oct. 1926, pp. 232–235. Review of work by E. Michel published by V.D.I. Verlag, Berlin, on Work Preparation or Planning as a Means of Lowering Production Costs.

INDUSTRIAL ORGANIZATION

Prison Industries. Psychology in the Organization of Prison Industries, E. A. Doll. Taylor Soc.—Bul., vol. 11, no. 4, Oct. 1926, pp. 219–223. Psychological classification of offenders; classification of industries; job analysis of prison industries; assignment of prisoners; incentives; institutions as laboratories.

INDUSTRIAL RELATIONS

Employers' Responsibilities. The Employer—His Responsibilities, C. Piez. Machy. (N. Y.), vol. 33, no. 3, Nov. 1926, pp. 196–197. Primarily employer's responsibility to his workers consists in providing them with steady work under sanitary conditions, at best possible wages; equitable distribution of returns of industry; discusses profitability of average business.

INDUSTRIAL TRUCKS

Freight Stations. Electric Trucks at D. L. & W. Car Float Freight Stations, R. M. White. Ry. Age, vol. 81, no. 16, Oct. 16, 1926, pp. 716–718, 6 figs. Effect savings where car floats at right angles to receiving platform necessitates long movement.

INSULATION, HEAT

Thermal Conductivities. Determination of the Thermal Conductivities of Insulation for Temperatures up to 1000 Deg. Fahr. on Other Than Flat Surfaces, R. H. Heilman. Mech. Eng., vol. 48, no. 11a, Mid-Nov. 1926, pp. 1297–1306, 16 figs. Report to National Research council reviewing past work, deducing defects in apparatus hitherto used and results obtained, and suggesting what should be done to obtain accurate and reliable apparatus and test results; apparatus for determination of thermal conductivity of pipe coverings; apparatus used in testing heat-insulating cements. Bibliography.

Nomography for Coefficient of Thermal Conductivity, M. T. Zarotschenzeff. Ice & Refrigeration, vol. 71, no. 4, Oct. 1926, pp. 246–248, 2 figs. Describes device which deals with various problems involved in design of insulation; presents nomography which gives practical way of finding any one of values involved as soon as other values are given.

INTERNAL-COMBUSTION ENGINES

Detonation. The Effect of Metallic Sols in Delaying Detonation in Internal Combustion Engines, C. J. Sims and E. W. J. Mardles. Faraday Soc.—Trans., vol. 22, no. 69, Oct. 1926, pp. 363–370. Action of colloidal sols in metals in gasoline; experiments and results in support of hypothesis of efficacy of pyrophoric metals in colloidal state; thermal decomposition of lead tetraethyl.

Ignition. High-Voltage Ignition for Internal-Combustion Engines and Their Latest Progress (Die Hochspannungszündung für Verbrennungsmotoren und ihre neuestem Fortschritte), Pickerott. Motorwagen, vol. 29, no. 22, Aug. 10, 1926, pp. 515–516. Discusses advantages and defects of both coil and magnet ignition.

Indicator-Card Analysis. The Tangent Method of Analysis for Indicator Cards of Internal-Combustion Engines, P. H. Schweitzer. Mech. Eng., vol. 48, no. 11a, Mid-Nov. 1926, pp. 1263–1274, 37 figs. Method for analyzing indicator diagrams, consisting of drawing tangents to pressure curve and subsequent graphical construction, gives direction of heat flow at any point of expansion or compression line; method is simple in execution, sufficiently accurate and has been of distinct assistance in testing internal-combustion engines.

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; GAS ENGINES; OIL ENGINES.]

IRON ALLOYS

Iron-Nickel. An Investigation of the Physical Properties of Some Nickel-Iron Alloys of the Invar Group, E. A. Blomqvist. Rensselaer Polytechnic Inst.—Eng. & Science Series, no. 13, June 3, 1926, 14 pp., 8 figs. Investigtion covers study of two groups of iron-nickel alloys, first containing 35.5 per cent of nickel and second 38 per cent of nickel with varying additions of manganese and magnesium; coefficients of expansion between 20 and 100 deg. cent. and up to 625 deg. cent. have been determined; these alloys still require small additions of magnesium for ready forgeability; effects of nickel and manganese indicated by earlier workers are confirmed; additions of either or both, increase coefficient of expansion; effect of heat treatment is also indicated; annealing causes decrease in length while quenching produces increase; on other hand, annealing raises coefficient of expansion while quenching lowers it.

L

LABOR TURNOVER

Analysis. Mechanical Aids in Analyzing Labor Turnover, R. E. Motley. Indus. Mgmt. (N. Y.), vol. 72, no. 5, Nov. 1926, pp. 323–328, 12 figs. Use of various forms necessary for obtaining and maintaining adequate records for each employee, and procedure followed in securing vital facts relative to man-power activities at plant of Atlantic Refining Co.

LATHES

Crankshaft. Wickes Semi-Automatic Crankshaft Lathe. Machy. (N. Y.), vol. 33, no. 2, Oct. 1926, p. 139, 3 figs. Designed for machining center bearing, flange end, and front end of automobile crankshafts.

LOCOMOTIVE BOILERS

Pitting. Means of Preventing Boiler Pitting, C. H. Koyl. Ry. & Locomotive Eng., vol. 39, no. 10, Oct. 1926, pp. 278–279. Author shows that it is easier to exclude oxygen from locomotive boiler than from stationary boiler or any closed water system; on districts with treated or naturally soft water there is no difficulty in preventing pitting with present open heater nor in materially reducing it by closed heater or even with closed-overflow injection properly chosen and properly operated.

LOCOMOTIVES

Decapod. Decapod Locomotives for Poland. Engineer, vol. 142, no. 3691, Oct. 8, 1926, p. 398, 1 fig. Constructed by J. Cockerill, Belgium; conditions to be met include ability of locomotives to work on curves of 150-m. radius; boiler is of Belpaire type; Heusinger-Walschaerts valve gear is used.

Design. The Present and Future of Locomotive Design, A. G. Trumbull. Ry. & Locomotive Eng., vol. 39, no. 10, Oct. 1926, pp. 284–287, 1 fig. In author's opinion, high-duty locomotive should have following characteristics: boiler of conventional type with considerably larger firebox volume than has been commonly used; steam pressure of 225 to 250 lb.; fixed minimum cutoff; means of increasing hauling capacity at starting when it can be advantageously employed; means to permit operation of locomotive with predetermined back pressure.

Development. Locomotive Developments of To-day. Ry. Rev., vol. 79, no. 15, Oct. 9, 1926, Contains abstracts of following papers: Present and Future of Locomotive Design, A. G. Trumbull, pp. 549–552, 5 figs.; Improving Steam Locomotive, J. Muhlfeld, pp. 553–555, 1 fig.; Designer Must Have Courage, W. L. Bean, pp. 555–556, 2 figs.

Electric. See ELECTRIC LOCOMOTIVES.

Four-Cylinder. Southern Railway—New Express Locomotive, "Nelson" Class. Engineer, vol. 142, no. 3692, Oct. 15, 1926, p. 413, 2 figs. 4–6–0 four-cylinder simple superheater engine with double-truck tender. See also Engineering, vol. 122, no. 3170, Oct. 15, 1926, pp. 473–474, 3 figs. and Ry. Gaz., vol. 45, no. 16, Oct. 15, 1926, pp. 454–455, 3 figs.

German. Heavy Freight Locomotives for the German Railways. Ry. Engr., vol. 47, no. 562, Nov. 1926, pp. 388–392, 9 figs. Among latest designs are some 2–8–0 type engines with two outside cylinders and three-cylinder design having 2–10–0 wheel arrangement.

Standard Locomotives for the German State Railways. Ry. Age, vol. 81, no. 19, Nov. 6, 1926, pp. 897–899, 5 figs. Builders are coöperating with Central Railway Administration in design of new power; two locomotives, a 4-cylinder Pacific-type 4–6–2 type and a 3-cylinder 2–10–0 Decapod, built from new standard designs by Henschel & Son, Cassel, Germany.

Three and Four Cylinder Locomotives of the German State Railways. Ry. & Locomotive Eng., vol. 39, no. 10, Oct. 1926, pp. 275–277, 3 figs. High-powered Pacific for passenger and 2–10–0 for freight service.

High-Pressure. The Use of High Steam Pressure in Locomotives, E. C. Schmidt and J. M. Snodgrass. Mech. Eng., vol. 48, no. 11a, Mid-Nov. 1926, pp. 1195–1202, 12 figs. Summary of advantages of using high-steam pressures in reciprocating locomotives and review of more notable applications of steam pressures of 240 lb. per sq. in. or higher.

Internal-Combustion. Internal-Combustion Locomotive and Passenger Car for British Guiana. Ry. Gaz., vol. 45, no. 14, Oct. 1, 1926, pp. 395–396, 4 figs. Details of 80-hp. locomotive and passenger car supplied by J. Fowler & Co. (Leeds) for use in transporting natives on sugar plantations.

Mountain-Type. Southern Pacific Mountain Type Locomotive. Ry. Rev., vol. 79, no. 18, Oct. 30, 1926, pp. 635–637, 5 figs. Use of integral cast-steel frame new departure in construction.

Oil-Electric. Application of the Oil Electric Lo-

comotive to Railroad Transportation, W. L. Garrison. South. & Southwest. Ry. Club, vol. 18, no. 11, Sept. 1926, pp. 6–25 and (discussion) 25–42, 7 figs. Oil-electric equipment consists of engine driving d.c. generator which supplies electric current to motors of usual type common to electrical railways; performance characteristics; main-line test of 100-ton oil-electric locomotive Long Island no. 401; advantages and possibilities.

Power Rating in Tractive Force. Preliminary Power Rating and Tractive Force of Modern Locomotives, R. Eksergian. Mech. Eng., vol. 48, no. 11, Nov. 1926, pp. 1095–1103, 8 figs. Determination of service requirements as to tractive force at low and high speeds for use in designing, and survey of general limitations governing for various types of locomotives in ordinary service.

Rivetless Tank. Integral Cylinder and Frame Casting, and Rivetless Tank. Ry. Age, vol. 81, no. 18, Oct. 30, 1926, pp. 848–849, 5 figs. Two recent developments of interest on Terminal Railroad of St. Louis are combined locomotive-cylinder and bed-frame casting made by Commonwealth Steel Co., and locomotive recently built at company's shops, feature of which is tender tank without rivets.

Superheater. New 0–6–0 Type Superheater Locomotive, London & Eastern Railway. Ry. Gaz., vol. 45, no. 16, Oct. 15, 1926, p. 458, 2 figs. Built at company's works, Darlington, for general freight traffic.

Tenders. Type of Locomotive Tender, Great Western Railway. Ry. Gaz., vol. 45, no. 16, Oct. 15, 1926, pp. 456–457, 7 figs. Self-trimming tender of new design, built at Swindon Works for use with "Castle"-class engines.

Three-Cylinder. Baldwin Builds Three Cylinder Locomotives. Ry. Rev., vol. 79, no. 16, Oct. 16, 1926, pp. 565–568, 7 figs. Heavy-mountain-type engines have novel cylinder and valve-motion arrangement; built for Denver & Rio Grande Western R. R.

4–12–2 Type Three-Cylinder Locomotive for the Union Pacific Railroad. Engineering, vol. 122, nos. 3164, 3168, 3171 and 3174, Sept. 3, Oct. 1, 22, and Nov. 12, 1926, pp. 291–292, 413–414, 519, and 598–599, 81 figs. partly on supp. plates, pp. 298 and 602. Locomotives built by American Locomotive Co. regarded as logical development from 2–10–2 type; details of running parts.

2-8-2. Baldwin 2–8–2 Type Locomotives of the Bikaner State Railway. Ry. Gaz., vol. 45, no. 17, Oct. 22, 1926, p. 491, 1 fig. Locomotive of Mikado-type 9-ton axle loads; engines are fitted with 2-feed Detroit lubricators for cylinders and steam chests, etc.

LUBRICANTS

Storage and Handling. Storage, Handling and Protection of Lubricants, A. F. Brewer. Elec. Ry. Jl., vol. 68, no. 17, Oct. 23, 1926, pp. 761–764, 6 figs. Central oil house desirable where large volume of lubricants is handled; proper construction makes danger of fire almost impossible; location near railroad siding or street reduces handling.

Synthetic. Composition and Chemical Constitution of Lubricating Substances and Their Synthesis [Betrachtungen über die Zusammensetzung und chemische Konstitution schmierfähiger Körper (Schmieröle) und ihre Synthese], A. Spilker. Zeit. für angewandte Chemie, vol. 39, no. 34, Aug. 26, 1926, pp. 997–999. Synthesis of lubricants by use of Bergius method of hydrogenation under high pressure without catalysis; viscosity of hydrogenation products of aromatic hydrocarbons; new class of synthetic lubricants of composition $C_{18}H_{37}$.

LUBRICATING OILS

Viscosity. The Viscosity of Lubricating Oils (Ueber den Begriff der Zähigkeit von Schmierölen), F. Sass. Zeit. des Vereines deutscher Ingenieure, vol. 70, no. 42, Oct. 16, 1926, pp. 1389–1392, 3 figs. Explains terms employed to define viscosity of oils, such as: Engler degree, Redwood seconds, Saybolt seconds, thrust modulus, factor of viscosity, specific viscosity, absolute viscosity and coefficient of viscosity; calculation is made to show that conversion of data obtained with viscosimeter into physical and technical values is not yet free of errors.

LUBRICATION

Steel-Mill Machinery. New Methods of Lubricating Steel-Mill Machinery, C. H. Bromley. Mech. Eng., vol. 48, no. 11a, Mid-Nov. 1926, pp. 1344–1346, 2 figs. Requirements in lubricating oils; characteristics of lubricants suitable for gears and journals; gravity- and pressure-type lubricating systems; rates at which oil should be supplied, etc.

M

MACHINE TOOLS

Crankshaft Machinery. Standard Machine Tools in the Willys-Overland Crankshaft Line-Up, F. H. Colvin. Am. Mach., vol. 65, no. 21, Nov. 18, 1926, pp. 825–827, 9 figs. Special fixtures enable standard machine tools to compete with single-purpose equipment; crankpins ground from rough; straightening and cutting keyways.

Individual Drive. Individual Drives for Lathes and Milling Machines (Einzelantrieb von Drehbänken and Fräsmaschinen), K. Meller. Werkstattstechnik, vol. 20, no. 18, Sept. 15, 1926, pp. 545–552, 21 figs. Discusses various kinds of individual drives, and gives examples of motors for head stock and flange drives for lathes; flange and multiple drives for milling machines.

Selection. Economic Factors to be Considered in the Selection of Machinery, P. M. Atkins. Am. Mach., vol. 65, no. 23, Dec. 2, 1926, pp. 891–894. Factors to be taken into consideration when determining what equipment will be most economical in service and in lasting qualities.

T-Slot Standardization. T-Slots, Their Bolts, Nuts, and Cutters. Mech. Eng., vol. 48, no. 11, Nov. 1926, pp. 1158–1159, 3 figs. Reason for standardization; existing standards and tendencies; A.E.S.C. Sectional Committee recommends width of throat greater than nominal diameter of bolt; inserted and reversible tongues and tongue seats to provide during transitional period for interchange of attachments fitted to T-slots having throat in some cases equal to and in some cases wider than nominal size of T-bolt.

MALLEABLE CASTINGS

Production and Properties. Malleable-Foundry Practice (Ein Streifzug durch das Gebiet der Tempergiesserei), A. Geissel. Giesserei-Zeitung, vol. 23, nos. 17 and 19, Sept. 1 and Oct. 1, 1926, pp. 482–487 and 537–540, 2 figs. Historical review; uses of malleable castings; chemical composition; pig iron and additions adapted to malleable castings; calculation of burdens; production methods; cupola practice; molding and casting, cleaning, annealing, etc.; annealing furnaces and process; chemical change due to malleableizing; strength properties; magnetic behavior; resistance to chemical influences; cleaning of annealing castings; importance of malleable castings.

MALLEABLE IRON

Black-Heart. The Embrittlement of Black Heart Malleable Iron Resulting from Heating Overstrained Material, R. D. Allen. Am. Soc. Steel Treating—Trans., vol. 10, no. 4, Oct. 1926, pp. 630–637, 6 figs. Presents entirely new developments in analyzing sensitive nature of black-heart malleable iron to brittleness (characterized by white fracture); author advances explanation of causes which have been found to contribute to this difficulty, and prescribes heat treatment which may be applied to reclaim original qualities of malleable iron that is known to have been subjected to conditions conducive to brittleness.

MATERIALS HANDLING

Economy in. Industry's Annual Tax for Materials Handling and Suggestions for Its Elimination, H. V. Coes. Mech. Eng., vol. 48, no. 11a, Mid-Nov. 1926, pp. 1253–1256, 5 figs. How national materials-handling bill can be reduced a billion dollars a year by utilization of equipment now available, relocation of stock rooms, and proper coördination of production with equipment for moving materials. See also Mfg. Industries, vol. 12, no. 5, Nov. 1926, pp. 359–361, 4 figs.

METALLOGRAPHY

Non-Ferrous. Non-Ferrous Metallography, J. S. G. Primrose. Foundry Trade Jl., vol. 33, nos. 513 and 514, June 17 and 24, 1926, pp. 453–456 and 486–490, 26 figs. Results of experience in research into new properties, pathological investigation of failures and examination to ensure compliance with rigid specifications; apparatus and illumination; modifications of Le Chatelier apparatus; discusses various types of microstructure including brasses, bronzes, aluminum, nickel and silver alloys, and copper. See also Metal Industry (Lond.), vol. 28, nos. 25 and 26, June 18 and 25, 1926, pp. 569–573 and 592–594, 24 figs.

METALS

Corrosion Fatigue. Corrosion Fatigue, A. P. Hague. Metallurgist (Supp. to Engineer, vol. 142, no. 3694), Oct. 29, 1926, pp. 152–154, 9 figs. As result of investigations carried out in Cammell Laird research laboratories, it would appear that corrosion fatigue is responsible for many cases of failure which in past have been labeled mysterious; deals with relationship of corrosion fatigue to failure of street-car and railway axles; there is reason to believe that pitting in many cases commences at minute non-metallic inclusions in steel.

Fatigue. The Mechanism of the Fatigue Failure of Metals, H. F. Moore. Franklin Inst.—Jl., vol. 202, no. 5, Nov. 1926, pp. 547–568, 13 figs. Demonstrates what happens when metal fractures under repeated stress; in considering fatigue of metals under repeated stress, it becomes necessary to recognize that ordinary formulas for stress and strain are strictly true only for ideal metal; actual metals are not ideal and hence ordinary formulas for stress and strain have high degree of precision only if large number of crystalline grains are considered together; actual metals do not develop strengths under load so great as would be expected from computed cohesion of their atoms; under repeated stress their strength is still smaller.

Latent Heat of Fusion. The Latent Heat of Fusion of Some Metals, J. H. Awbery and E. Griffiths. Phys. Soc. of Lond.—Proc., vol. 38, Aug. 15, 1926, pp. 378–398, 4 figs. Latent heats of number of commoner metals have been measured by determining total heat of liquid and solid from series of initial high temperatures; results for latent heat for aluminum, antimony, bismuth, lead, magnesium, tin and zinc; values for specific heats up to melting point, obtained by differentiation of temperature total heat curves.

Local Stresses. Local Stresses. Metallurgist (Supp. to Engineer, vol. 142, no. 3694), Oct. 29, 1926, pp. 145–146. Discusses cases in which severe local stressing may occur, such as sharp corners, notches of any kind, and jointing of material; suggestion that local stresses due to riveting can be avoided by use of welded joints is at first sight attractive, but there are obvious compensating difficulties.

Melting and Mixing. Melting and Mixing. Metallurgist (Supp. to Engineer, vol. 142, no. 3694), Oct. 29, 1926, pp. 146–147. Discusses question of need for repeated melting of certain alloys if satisfactory castings are to be obtained; refers to work of Carpenter and Edwards on copper-aluminum alloys, strongly confirming view that nothing is to be gained by remelting; suggests that difficulties which arise when metals melted together for first time are cast, may be due to presence of gases.

MILLING CUTTERS

Theory. Theory of Milling Cutters, N. N. Sawin. Mech. Eng., vol. 48, no. 11a, Mid-Nov. 1926, pp. 1203–1209, 7 figs. Presents theory which, it is believed, will provide basis for discussion; attempt is made to find theoretical formulas for calculating strength of mills and to determine their work.

MILLING MACHINES

Cam. Hydraulically Loaded Cam Milling Machine. Engineer, vol. 142, no. 3691, Oct. 8, 1926, p. 388, 3 figs. Heavy-duty semi-automatic machine designed by Swedish concern; it is claimed to be of entirely new design and to be unsurpassed by any other of its type in matter of power; it will admit cams having maximum radius up to 9 in. and minimum radius down to $3^1/_2$ in.

Knee-Type. Heavy Hogging Cuts on Knee Type Millers, H. Rowland. Can. Machy., vol. 36, no. 16, Oct. 14, 1926, pp. 13–15, 5 figs. Illustrates wide use of knee and column-type machines for heavy jobs, specially in manufacture of electrical equipment.

MOLDS

Drying. The Drying of Molds (Das Trocknen der Formen), O. Weyer. Giesserei, vol. 13, no. 38, Spet. 18, 1926, pp. 709–710, 1 fig. Enumerates advantages of drying ovens over drying chambers, and describes type of drying oven by German firm.

The Present Status of Drying Equipment for Cast-Iron and Cast-Steel Molds (Bericht über den augenblicklichen Stand der Trockenvorrichtungen für Eisenguss- und Stahlgussformen), Erbreich. Giesserei, vol. 13, no. 40, Oct. 2, 1926, pp. 741–747, 16 figs. Test results show advantages of well-filled drying chamber, and necessity of taking moisture measurements which are of great importance in determining economical drying of molds.

MOTION STUDY

Motion-Time Analysis. Motion-Time Analysis—A New Step in Operation-Study and Rate-Setting, L. P. Alford. Mfg. Industries, vol. 12, no. 5, Nov. 1926, pp. 341–344, 5 figs. Describes new development of past year in analysis of operations to establish standard times and set rates; this new law of management has been discovered by A. B. Segur, who claims that within practical limits, time required by all expert workers to perform true fundamental motion is constant.

MOTOR BUSES

Albion. The Latest Albion Omnibus. Motor Transport, vol. 43, no. 1128, Oct. 25, 1926, pp. 489–490, 4 figs. New forward-driven pneumatic-tired model affording maximum accommodation for 32 passengers.

Paris. New Omnibuses for Paris. Motor Transport, vol. 43, no. 1129, Nov. 1, 1926, pp. 509–511, 10 figs. Single decker carrying 40 passengers, low-level design; driver's seat is over engine.

MOTOR TRUCKS

Low-Deck. The Low-Deck $2^1/_2$-Tonner. Motor Transport, vol. 43, no. 1127, Oct. 18, 1926, pp. 451–453, 8 figs. Latest low-loading utility vehicle combines originality with practical assembly of well-tested units; made by Corber & Heath, Dartford, Eng.

Paris Show. The Paris Salon. Motor Transport, vol. 43, no. 1129, Nov. 1, 1926, pp. 515–519, 14 figs. Review of development in Continental design as indicated by exhibits.

The Paris Transport Exhibition. Motor Transport, vol. 43, no. 1128, Oct. 25, 1926, pp. 485–488, 7 figs. Progress of gas-producer vehicles and electrics; new models introduced by well-known continental factories.

Semi-Trailer. The Marcel Leyton Semi-Trailer. Motor Transport, vol. 43, no. 1128, Oct. 25, 1926, p. 494, 3 figs. Particulars of new 6-wheel conversion, with automatic coupling mechanism made in Belgium.

Tipping Devices. Tipping Devices for Motor Trucks (Kippvorrichtungen auf Lastkraftwagen), W. Rödiger. Zeit. des Vereines deutscher Ingenieure, vol. 70, no. 44, Oct. 30, 1926, pp. 1463–1466, 10 figs. New devices for motor trucks with hydraulic and electric drive; tri-lateral tippers of various types.

N

NICKEL STEEL

Nickel-Chromium. Heat Resistant Steels. Gas & Oil Power, vol. 22, no. 253, Oct. 7, 1926, pp. 4–5, 2 figs. Possibilities of new nickel-chromium alloys for gas-turbine service.

NON-FERROUS METALS

Light. Future Developments in the Light Metals, F. C. Frary. Indus. & Eng. Chem., vol. 18, no. 10, Oct. 1926, pp. 1016–1019. Deals with magnesium, beryllium, aluminum and their uses.

Standardization. Standardization in Foundry Practice (Normungsarbeiten im Giessereiwesen), Groeck. Giesserei-Zeitung, vol. 23, no. 18, Sept. 15, 1926, pp. 512–514, 4 figs. Work of Committee on Non-Ferrous Metals: Proposed standards for copper ingots, bars, etc.; brass castings; bronzes, designations and uses; and bronze castings.

O

OIL ENGINES

Fiat. Fiat 14-H.P. Horizontal Oil Engine. Engineering, vol. 122, no. 3170, Oct. 15, 1926, p. 489, 2 figs. Engine is crosshead type, and has mechanically operated air-admission valve of semi-rotary type; hot bulb is hemispherical in shape and is held down to water-cooled cylinder cover by steel clamping ring.

Fuel Selection. The Practical Selection of Oil-Engine Fuels, E. J. Kates. Power, vol. 64, no. 18, Nov. 2, 1926, pp. 659–661, 4 figs. Suggestions for selecting from various grades of fuel oil on market, one that will give best combination of low price and satisfactory operation in oil-engine plant.

Large Marine. The Large Marine Oil Engine: Has it Overstepped Itself? Mar. Engr. & Motorship Bldr., vol. 49, no. 590, Oct. 1926, pp. 380–381. View is advanced that progress has been too rapid in certain directions.

Modern. The Modern Oil Engine, E. C. Magdeburger. Mech. Eng., vol. 48, no. 11a, Mid-Nov. 1926, pp. 1315–1328, 29 figs. Review of means used by foreign and domestic oil-engine builders to fit this prime mover to constantly broadening field of its application.

Plenty-Still. The Plenty-Still Oil Engine. Engineering, vol. 122, nos. 3172 and 3173, Oct. 29 and Nov. 5, 1926, pp. 536–538 and 585–586, 17 figs. Principle of design of single-cylinder 2-stroke engine.

Scott-Still. The Still Oil-Stream Engine in Practice. Power, vol. 64, no. 20, Nov. 16, 1926, pp. 730–731, 1 fig. Results of trials on S.S. Dolius with installation of two 4-cylinder engines of Diesel-steam design with total capacity of 2500 hp.; this motorship has been in round-the-world service sufficiently long to prove that expected difficulties will not assume tangible form.

Sulzer Heavy-Oil. Two New Sulzer Heavy-Oil Engines. Mar. Engr. & Motorship Bldr., vol. 49, no. 590, Oct. 1926, pp. 378–379 and 390, 2 figs. High-compression designs having airless fuel injection and automatic fuel valves.

Two-Stroke-Cycle. Further Development of the Two-Stroke Oil Engine at the Krupp Germania Yard (Die Weiterentwicklung der Zweitakt-Oelmaschine auf der Fried. Krupp Germaniawerft, Kiel-Gaarden), E. Herkt. Werft-Reederei-Hafen, vol. 7, no. 15, Aug. 7, 1926, pp. 388–392, 11 figs. Development of single-acting into new double-acting two-stroke engine with scavenging port of 1800 hp. per cylinder, to provide cheaper oil engines.

Vickers-Petters. Two-Cycle Marine Oil Engine. Engineer, vol. 142, no. 3692, Oct. 15, 1926, pp. 414–415, 5 figs. Twin-screw motor tug Southland, is equipped with two main engines of Vickers-Petters C.S. 6M. marine type, designed to give normal output of 600 s.hp. when running at designed speed of 270 r.p.m.; this is first of its kind to be adopted for marine use and represents largest size of engine of its particular type. See also Engineering, vol. 122, no. 3170, Oct. 15, 1926, pp. 475–478, 9 figs.; and Shipbldg. & Shpg. Rec., vol. 28, no. 17, Oct. 21, 1926, pp. 437–438, 2 figs.

Werkspoor. The Double-Acting Werkspoor Engine. Motorship (Lond.), vol. 7, no. 79, Oct. 1926, pp. 240–241, 5 figs. New design with double-function valves in head for installation in Anglo-Saxon Co.'s tankers.

OIL FUEL

Recovery from Coal. Fluid Fuels, A. E. Dunstan. Gas & Oil Power, vol. 22, no. 253, Oct. 7, 1926, pp. 6–7. Deals with Bergius process and synthol. (Abstract.) Paper read before Instn. Fuel Economy Engrs.

Research. Fuel and Lubrication Research, W. A. Whatmough. Automobile Engr., vol. 16, no. 220, Oct. 1926, pp. 376–378, 1 fig. Explanatory résumé of recent investigation in carburation and oils.

OPEN-HEARTH FURNACES

Ford Plant, Detroit. Ford Open-Hearth Plant Unique, F. L. Prentiss. Iron Age, vol. 118, no. 23, Dec. 2, 1926, pp. 1539–1545, 13 figs. New open-hearth unit at Ford plant contains number of interesting features, both in arrangement and practice, including small size of ingots made, method of pouring and stripping ingots, way slag is handled and arrangement of stockyard, which is on ground level, or same level as pouring side, instead of having usual high line on which scrap is brought in on tracks on level with charging side; there are four 100-ton basic furnaces of tilting type.

OXYACETYLENE WELDING

Alloy Steels. Gas Welding Alloy Steels, W. Stewart. Welding Engr., vol. 11, no. 10, Oct. 1926, pp. 41–42. Points out that all alloys can be welded; heat treatment of welds; brazing alloy steels; why some bronze welds fail; use of cast-iron filler rod; experience with welded bits.

Copper. Oxy-Acetylene Welding of Copper, A. Eyles. Machy. (N. Y.), vol. 33, no. 3, Nov. 1926, pp. 199–200, 3 figs. Precautions necessary in welding of copper; preparing copper for welding; torch and flame adjustment.

Refrigerating Industry. Oxy-Acetylene Welding in Refrigerating Work, J. W. Catalene. Refrigeration, vol. 40, no. 4, Oct. 1926, pp. 64–65. Strength and tightness essentials; welding of freezing-tank coils; underground pipe lines; welding replaces soldering of ice cans; castings cut by flame. (Abstract.) Paper read before Nat. Assn. Practical Refrig. Engrs.

Textile Mills. Oxy-Acetylene Welding by Textile Mills. Textile World, vol. 70, no. 14, Oct. 2, 1926, pp. 59–61, 2 figs. Repairs on many machine parts made more quickly and inexpensively than by ordinary methods; production increased by saving in time; waste from scrapped castings reduced; work includes welding proper, cutting, coating, and building-up of worn and undersized surfaces.

P

PAINTING

Compressed-Air Applications. Lacquering with Compressed Air. Eng. Progress, vol. 7, no. 9, Sept. 1926, p. 250, 3 figs. Describes compressed-air paint sprayers for use in many branches of industry, both for thin and thick paints and varnishes; most important parts of such apparatus are paint reservoir, spraying nozzle, air pipe and needle valve.

PARACHUTES

U. S. Army Standard. Development and Construction of the Standard Army Parachute, J. Bouforte. Mech. Eng., vol. 48, no. 11a, Mid-Nov. 1926, pp. 1234–1239, 11 figs. Description of standard army parachute; experimental tests and results; difficulties attending compilation of reliable parachute data; important characteristics of parachutes; trend of modern development.

PIPE, CAST-IRON

Centrifugally Cast. Centrifugal Cast-Iron Pipe. West. Constr. News, vol. 1, no. 20, Oct. 25, 1926, pp. 61–63, 5 figs. Details of manufacture of de Lavaud and mono-cast pipe and comparisons with old sand-cast methods.

PISTON RINGS

Research. Researches on the Piston Ring, K. Ebihara. Soc. of Mech. Engrs. (Japan)—Jl., vol. 29, no. 113, Sept. 1926, pp. 533–564, 24 figs. With view of improving piston ring, amount of radial pressure exerted by piston ring on cylinder wall was at first ascertained by means of specially designed apparatus; describes ring which exerts nearly uniform pressure on cylinder wall, and calculates mathematically maximum stress of ring under working conditions; 3-hp. 4-cycle horizontal Diesel engine was used for experimental researches in connection with effect of pressure of rings on gas tightness, and determining frictional resistance between piston ring and cylinder wall. (In English.)

PLATES

Circular. The Flexure of Thick Circular Plates, C. A. Clemmow. Roy. Soc.—Proc., vol. 112, no. A762, Oct. 1, 1926, pp. 559–598. Investigation of flexure of thick circular plate held so that there is no displacement at cylindrical edge, subjected to uniform pressure over one of flat surfaces.

POWER GENERATION

United States. Power Generation, V. E. Alden. Am. Inst. Elec. Engrs.—Jl., vol. 45, no. 11, Nov. 1926, pp. 1130–1135. Report of committee; important technical achievements of past year; auxiliary power supply; use of steam at higher temperatures; joint use of steam stations and water-power plants; probable useful life of steam stations now being built.

PRINTING MACHINERY

Press Drive and Control. Newspaper Press Drive and Control, E. H. Laabs. Elec. World, vol. 88, no. 19, Nov. 6, 1926, pp. 953–956, 6 figs. Modern unit-type presses have separate motors for threading and running speeds; silent-tooth chain drive popular; conveniently located push-button control stations afford flexibility of operation and safety.

PULVERIZED COAL

Boiler Firing. A New Pulverized-Fuel Firing System. Mech. World, vol. 80, no. 2075, Oct. 8, 1926, pp. 279–280, 3 figs. Recent development made by Clarke, Chapman & Co.; boiler is of Woodeson patent, water tube type; fuel is delivered by bucket elevator into 10-ton coal bunker situated above pulverizing plant; pulverizer is contained in cylindrical case provided with renewable lining in which rotates single disk carrying number of beaters in manner resembling paddle wheels; surmounting pulverizer is separating chamber containing system of baffles.

Pulverised-Fuel Installation at St. Pancras Power Station. Engineering, vol. 122, no. 3173, Nov. 5, 1926, pp. 567–568, 2 figs. Lopulco system of firing with pulverized coal was decided upon; installation comprises two Babcock and Wilcox boiler units of cross-drum marine type; coal dryers are of steam-heated type.

Pulverizers. The Dressing of Pulverized Fuel in Large Power Stations, C. Naske. Eng. Progress, vol. 7, no. 9, Sept. 1926, pp. 239–240, 6 figs. Maximum capacity mill in Moabit power station of Berlin Electrical Works; advantages of compound mills.

Unit System. Results with Unit Pulverizers at Cahokia, E. H. Tenney. Power, vol. 64, no. 22, Nov. 30, 1926, pp. 806–808, 4 figs. With neither air preheater nor economizer and burning undried coal having 9 per cent moisture and 15 per cent ash, this unit mill installation gives boiler efficiencies of 82 to 85 per cent.

PUMPS

Air-Lift. Some Pertinent Facts on Air Lift Pumping Systems, G. Lee. Indus. Mgmt. (N. Y.), vol. 72, no. 5, Nov. 1926, pp. 304–310, 12 figs. Discussion of principles and design for industrial applications.

PYROMETERS

Surface-Temperature Measurements. Pyrometers for Surface-Temperature Measurements. Engineering, vol. 122, no. 3171, Oct. 22, 1926, pp. 507–508, 3 figs. New form of pyrometer patented by Cambridge Instrument Co., London, which has been successfully employed on calendering bowls, paper-making rollers, vulcanizing press platens, rubber-press rollers and other similar machines; instruments are of thermoelectric type.

R

RADIATORS

Heating Effect. The Heating Effect of Radiators, C. Brabbée. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 32, no. 11, Nov. 1926, pp. 731–735, 5 figs. Results of further investigations on heating effect of radiators supplementing data given in previous paper.

RAILWAY MANAGEMENT

Compiling Operating Statistics. Compiling Operating Statistics by Punch Cards. Ry. Rev., vol. 79, no. 18, Oct. 30, 1926, pp. 647–648. Facts and figure desired made easily obtainable and accessible.

Materials Reclamation. Atlantic Coast Line Finds Profit in Reclaiming Materials. Ry. Age, vol. 81, no. 17, Oct. 23, 1926, pp. 761–765, 4 figs. Savings approach $3,000,000 annually; stores reclaim track material; manganese frogs welded; reclamation systematized by accounting.

Organization. Railway Organization, J. C. Clark. Mech. Eng., vol. 48, no. 11a, Mid-Nov. 1926, pp. 1247–1250. Administration, organization, and management defined; fundamental differences distinguishing railroad industry; methods of controlling business; functional organization; methods of organization; coordinating work of various departments.

Sanitary Engineering Department. How Cotton Belt Cut Malaria Rate 97 Per Cent in Nine Years, H. W. Van Hovenberg. Ry. Eng. & Maintenance, vol. 22, no. 10, Oct. 1926, pp. 382–390, 16 figs. Sanitary engineering staff of St. Louis Southwestern carried remedial measures to men in field and also stimulated improvement in station and camp-car sanitation. See also Ry. Age, vol. 81, no. 17, Oct. 23, 1926, pp. 755–760, 10 figs.

RAILWAY MOTOR CARS

Gasoline-Electric. New Underframe for Motor Car (Ein neues Triebwagen-Untergestell), J. Buchli. Verkehrstechnik, vol. 39, no. 41, Oct. 8, 1926, pp. 689–693, 6 figs. New underframe with Cardan gears in which guide frame is placed between two driving axles on which two motors are flexibly suspended.

RAILWAY OPERATION

Train Control. Union Pacific Uses Train Control Successfully on 225-Miles. Ry. Signaling, vol. 19, no. 11, Nov. 1926, pp. 426–432, 16 figs. Also Ry. Age, vol. 81, no. 17, Oct. 23, 1926, pp. 773–777, 11 figs. In 1925, system of two-speed continuous train control on 102 miles of its double-track main line between Sidney, Nebr. and Cheyenne, Wyo., was placed in service; same system as manufactured by Union Switch & Signal Co. was extended eastward from Sidney to North Platte, Nebr., a distance of 123 miles and placed in service on Feb. 1, 1926.

Train Stops. Baltimore & Ohio Installs G.R.S. Auto-Manual Train Stop, F. P. Patenall. Ry. Signaling, vol. 19, no. 10, Oct. 1926, pp. 395–400, 15 figs. Wayside inductors maintained by signal forces; master mechanic supervises maintenance of engine equipment; facilities provided for both outbound and inbound inspections.

RAILWAY SHOPS

Machining Methods. Railway Tool Foremen Discuss Modern Methods. Am. Mach., vol. 65, no. 18, Oct. 28, 1926, pp. 703–705, 9 figs. Fixture for drilling and milling key slots in piston rods; device for timing valves; repairing stoker racks; gage used in planning crossheads.

RAILWAY SIGNALING

Automatic Block. Committee IV—Direct Current Automatic Block Signaling, F. N. Fox. Am. Ry. Assn., Signal Section—Proc., vol. 24, no. 2, Oct. 1926, pp. 349–351. D.c. vibrating highway-crossing bell, reducing effect of lightning on d.c. track circuits.

Some Economic Problems of Automatic Block Signaling a Single-Track Railroad, B. T. Anderson. Am. Ry. Assn., Signal Section—Proc., vol. 24, no. 2, Oct. 1926, pp. 285–300 and (discussion) 301–308, 11 figs. Type of installation; location of signals; typical track and signal layout; economy of automatic signaling.

Economics. Committee I—Economics of Railway Signaling, B. T. Anderson. Am. Ry. Assn., Signal Section—Proc., vol. 24, no. 2, Oct. 1926, pp. 308–317. Economy of replacing crossing watchmen with highway-crossing flashing signals during five-year period.

Interlocking. Committee III—Power Interlocking, F. W. Pfleging. Am. Ry. Assn., Signal Section—Proc., vol. 24, no. 2, Oct. 1926, pp. 261–272. Installation of electrical interlocking system; automatic cross-ing-protection circuits at railroad crossings using inoperative and operative approach signals.

Practice. Committee X—Signaling Practice, F. B. Wiegand. Am. Ry. Assn., Signal Section—Proc., vol. 24, no. 2, Oct. 1926, pp. 317–323. Use of derails; light-signal requirements and requisites.

Single-Track. Economics of Single Track Signals, B. T. Anderson. Ry. Signaling, vol. 19, no. 11, Nov. 1926, pp. 433–436, 10 figs. Reconstruction of installation provides block spacing on time instead of distance.

REFRACTORIES

Boiler-Furnace. Refractories Service Conditions in Furnaces Burning Pittsburgh Coal on Chain Grates, R. A. Sherman and W. E. Rice. Mech. Eng., vol. 48, no. 11, Nov. 1926, pp. 1115–1122, 19 figs. Progress report of A.S.M.E. special research committee on boiler-furnace refractories.

Thermal Conductivities. A Comparison of the Temperature Diffusivities and Thermal Conductivities of Silica and Fireclay Refractories, A. T. Green. Gas World (Coking Sect.), vol. 85, no. 2200, Oct. 2, 1926, pp. 10–12. Comparison of data obtained by author for temperature diffusivity and thermal conductivity of silica brick and firebrick containing less than 75 per cent SiO_2; silica bricks, in general, show greater rate of increase of diffusivity and thermal conductivity with temperature than firebricks; it is indicated that material possessing low porosity is not necessarily good conductor of heat; in many cases reverse is the case, particularly at high temperatures.

REFRIGERATING MACHINES

Mercury Compressor. A Mercury Compressor Evolved from the Archimedes Screw Pump, J. G. DeRemer. Mech. Eng., vol. 48, no. 11a, Mid-Nov. 1926, pp. 1228–1233, 10 figs. Development of novel type of gas compressor which functions on principle of Archimedes helical pump, using mercury as compressing liquid; compressor, as now developed, consists of steel cylinder mounted to swing in circle as conical pendulum, wrist-like motion at top being accommodated by two flexible metallic tubes which conduct gas into and out of compressor; mercury flowing through helical passageway within cylinder picks up separate volumes of gas, and compresses them to any desired value without use of any internal moving parts whatsoever; describes two applications of compressor to refrigeration practice.

REFRIGERATION

Absorption System. New Lease of Life for the Absorption Refrigerating System, G. Grow. Power, vol. 64, no. 21, Nov. 23, 1926, pp. 767–768, 2 figs. How Platen-Munters pumpless system works; apparatus comprises generator, condenser, evaporator, absorber, heat exchanger and thermo-siphon, which are interconnected by pipes; how apparatus is operated.

Developments. Report of Refrigeration Committee 1925–1926. Nat. Elec. Light Assn.—Report, no. 256-12, for mtg. May 17–21, 1926, 3 pp. Points out that nothing extraordinary or new in principle has appeared during war; discusses value of refrigeration business and load factor; considerations which should govern choice of machine for central-station promotion.

Electric. Electric Refrigeration. Elec. World, vol. 88, no. 18, Oct. 30, 1926, pp. 895–913, 11 figs. Nation-wide investigation of existing conditions indicates imperative need for stabilization of production, selling and servicing practices; saturation only 1.78 per cent of domestic customers; conclusions of survey.

ROLLING MILLS

Bar Mills. New Rolling Mills—Gautier Plant, Cambria Works, Bethlehem Steel Co., Johnstown, Pa., R. H. Stevens. Iron & Steel Engr., vol. 3, no. 10, Oct. 1926, pp. 446–452, 1 fig. Four new bar mills have been installed and power house for furnishing additional electric current for same; new mills were designed for use of approximately 30 ft. billets; 14-in. mill is designed to roll channels, beams, angles, automobile rim sections, light rails and flats; 13-in. mill is used for rolling rounds, squares, flats and concrete bars in larger sizes; 10-in. mill is more of tonnage unit; 9-in. mill is jobbing unit designed to roll miscellaneous shapes.

Blooming Mills. Manipulators for Two High Reversing Blooming Mill, C. J. Klein. Iron & Steel Engr., vol. 3, no. 10, Oct. 1926, pp. 439–441 and (discussion) 441–443. Design of manipulator must be such that there is practically no cause for breakdown or if such would occur, it could be readily fixed with least possible delay; traces developments and describes general design of up-to-date manipulators.

Manipulators for Blooming Mills, L. Iverson. Iron & Steel Engr., vol. 3, no. 10, Oct. 1926, pp. 437–439, 3 figs. Ideal manipulator is one which can perform required operations of pushing, turning and grasping ingot or bloom in minimum of time, with least attention for upkeep and repairs, solution of problem as it has been accomplished by Mesta Machine Co.

Electric Drive. Electrically Driven Rolling Mills. Electricity, vol. 40, nos. 1836, 1838, 1839, 1842 and 1844, Jan. 15, 29, Feb. 5, 26 and Mar. 12, 1926, pp. 35–37, 72–74, 95–96, 162 and 189–190, 17 figs. Describes a number of arrangements more commonly in use and several typical Asea installations; single-speed and variable-speed motors; motors in tandem, according to Danielsons patent.

Merchant Mills. Schedules 10-Inch Merchant Mill, J. D. Knox. Iron Trade Rev., vol. 79, no. 21, Nov. 18, 1926, pp. 1297–1299 and 1304, 4 figs. Mill, built by Morgan Construction Co., is designed to roll rounds from $^1/_4$ in. to 1 in. or equivalent sizes of squares and flats, and strip from $^7/_8$ in. to $2^1/_2$ in. wide with minimum thickness of 0.04 in.; installed in plant of Corrigan, McKinney Steel Co., Cleveland.

Plate Mills. Plate Mills—Recent Developments and Tendencies, F. M. Gillies. Am. Iron & Steel Inst.—Advance Paper, for mtg. Oct. 22, 1926, 16 pp. Most outstanding of recent improvements is electric drive and use of electrical equipment in general mill work; improvement in design and layout of buildings used in manufacture of plate; advancement in heating end of mill has been more in kinds of fuel burned and methods of burning them than in design of furnaces; development and principle of handling material; shearing developments; tendencies toward specialization. See also abstract in Iron Age, vol. 118, no. 18, Oct. 28, 1926, pp. 1197–1198.

S

SAND, MOLDING

Dressing. Improvements in the Field of Molding-Sand Preparation (Neuerungen dur dem Gebiete der modernen Formsandaufbereitung), H. Behrens. Zeit. für die gesamte Giessereipraxis, vol. 47, no. 38, Sept. 19, 1926, pp. 398–400, 8 figs. Describes sand-dressing plant of O. Ullrich Corp., Leipzig, Germany; main advantage of this semi-automatic plant is that it can handle new sand in its original moist state, that is, it can mix it with old sand and coal dust, without first drying and mulling it; this eliminates high cost of drying and mulling; most important part of plant is new type of mixer known as Eirich patent.

SAWS

Modern Sawing Machinery. Modern Sawing Machinery, J. A. McKeage. Mech. Eng., vol. 48, no. 11, Nov. 1926, pp. 1135–1142, 29 figs. Motorized and belt-driven machines; rip saws; cut-off saws; combination saws; Dado machines, electric hand saw; future prospects.

SCREW THREADS

Cutting. Equipment for Cutting Accurate Threads. Machy. (N. Y.), vol. 33, no. 2, Oct. 1926, pp. 129–130, 5 figs. Equipment for cutting threads required to be very accurate as to form, lead and finish.

SMOKE

Abatement. Smoke Abatement, Its Effects and Its Limitations, H. B. Meller. Mech. Eng., vol. 48, no. 11a, Mid-Nov. 1926, pp. 1275–1283, 4 figs. Advantages accruing to manufacturers and public from smoke abatement; anti-smoke laws are incomplete in that they deal only with part of air-pollution evil that is less grave and less menacing to health.

Problems. Present Status of the Smoke Problem, O. Monnett. Mech. Eng., vol. 48, no. 11a, Mid-Nov. 1926, pp. 1284–1285. Points out that real problem today is small heating plant; importance of supervision; future possibilities.

SOLDERS

Tin. Some Practical Suggestions for the Conservation of Tin in Solders and Dipping Baths, A. Eyles. Metal Industry (Lond.), vol. 29, nos. 15 and 18, Oct. 8 and 29, 1926, pp. 340–342 and 415. Oct. 8: Notes on fluxes and making solders. Oct. 29: Reclamation of tin and tin-lead alloys from scrap.

SOLIDS

Internal Friction. Internal Friction in Solids, A. L. Kimball and D. E. Lovell. Am. Soc. Mech. Engrs.—Advance Paper, for mtg. Dec. 6–9, 1926, 17 pp., 13 figs. In connection with test devised to determine quantitatively amount of friction within metal of steel shaft, it was found that internal frictional forces were totally unlike those of viscous fluid, as assumed by many investigators, where forces are greater the more rapid the deformation; instead of this, dissipative forces were found to be the same whatever the speed of deformation.

STEAM

High-Temperature. 1,250-Degree Steam for Process Work in France, R. H. Andrews. Power, vol. 64, no. 20, Nov. 16, 1926, p. 731, 1 fig. Describes 2500-sq. ft. superheater recently built in France to deliver low-pressure steam at 8 lb. per sq. in. and 1100 deg. fahr.; factors that determine ability of metal to withstand high temperatures and pressures.

STEAM ACCUMULATORS

Electric Boilers. Steam Accumulator is Used with Electric Boilers. Power, vol. 64, no. 19, Nov. 9, 1926, pp. 688–692, 8 figs. One of first high-pressure steam-accumulator plants to be installed in America is new newsprint mill erected by Price Bros. & Co., Riverbend, Quebec; accumulator floating on line between two governor valves absorbs or delivers difference between steam passing high-pressure valve and demand for low-pressure process steam.

STEAM ENGINES

Marine. Marine Steam Engines. Times Trade & Eng. Supp., vol. 19, no. 433, Oct. 23, 1926, p. 147. Attention is being paid in Germany to method of increasing economy of marine steam engines which depends on addition of low-pressure turbines to reciprocating engines; this combination system is not in itself new, but novelty lies in fact that exhaust steam of reciprocating engine is used in small high-speed turbine which by double-reduction gear works upon same line of shafting as is driven by reciprocating engine; devised by Wach and Bauer.

Uniflow. Uniflow Engine Designed for Bleeder Operation. Power Plant Eng., vol. 30, no. 21, Nov. 1, 1926, pp. 1145–1146, 2 figs. Engine built for English woolen mill to work at 160 lb. initial pressure with 550 deg. fahr., receiver pressure of 60 lb. and steam bled from receiver for process work in mill.

STEAM PIPES

Central Stations. Station Piping. Nat. Elec. Light Assn.—Report, no. 256-56, June 1926, 29 pp., 20 figs. Characteristics of high-pressure piping systems; new standards; specifications for forged or rolled steel-pipe flanges for high-temperature service; design and specifications of pipe systems for Edgar Station at Weymouth, Boston; tests on pipe flanges. Bibliography.

High-Pressure. Steam Pipes for Extra High Pressure and Temperature, J. A. Aiton. Inst. of Mar. Engrs.—Trans., vol. 38, Oct. 1926, pp. 229–243 and (discussion) 243–258, 4 figs. Points out that no drastic alterations are necessary either in materials or in method of manufacture to meet modern conditions in piping, but great care and experience are necessary in all departments of work, especially in design.

STEAM POWER PLANTS

Cost Reduction in. A Little Engineering Study Saves $24,000 Yearly in Hospital. Power, vol. 64, no. 17, Oct. 26, 1926, pp. 616–617, 4 figs. Account of great savings obtained in small power plant, supplying steam heat, electric lighting and power, hot water to laundry and other services in Long Island College Hospital, through application of well-recognized engineering practices.

Diesel-Engined. Diesel Engines Used to Enlarge Steam Plant, A. T. Ragan. Power Plant Eng., vol. 30, no. 21, Nov 1, 1926, pp. 1154–1155, 2 figs. Overloaded condition remedied by adding two Diesel units to handle one section of flour mill in Coffeyville, Kansas.

Ford Motor Co., Ford City, Ontario. The Ford Canadian Power Plant. Power, vol. 64, no. 23, Dec. 7, 1926, pp. 850–855, 9 figs. Coördination of heating and power requirements together with high-grade boiler-room equipment using pulverized coal, gives plant of high economy; attention to appearance and cleanliness produces worth-while results.

Iron Works. Mystic Iron Works Boilers Use Two Fuels. Power Plant Eng., vol. 20, no. 21, Nov. 1, 1926, pp. 1165–1166, 2 figs. Furnace gas and coke breeze, obtained as by-products, generate steam for iron works and coke-oven plant in Massachusetts.

Metallurgical Works. Progress in Steam Power Plants for Metallurgical Works (Fortschritte der Dampfkraftversorgung in Hüttenwerken), H. Wolf. Stahl u. Eisen, vol. 46, no. 41, Oct. 14, 1926, pp. 1385–1393, 7 figs. Economic considerations; boiler plant; new gas-fired boilers; cost of power; bleeder-steam preheating; installation and operating costs. Includes discussions by H. Froitzheim and H. Wolf.

Modern Tendencies. Modern Tendencies in Steam Power Plants, S. Goto. Inst. Elec. Engrs. of Japan—Jl., no. 458, Sept. 1926, pp. 1069–1092, 27 figs. Present status of modern steam power plants, especially with regard to use of high-pressure and high-temperature steam, improvement of thermal efficiency by means of reheating and regenerative cycles; author suggests that boilers, turbines and other machinery of domestic make be more widely used in Japan. (In Japanese.)

Steel Works. Steel-Mill Power Plant Has Many Unusual Features. Power, vol. 64, no. 22, Nov. 30, 1926, pp. 798–801, 7 figs. New station of Bethlehem Steel Corp., at Johnstown, Pa., has 18,750-kva. turbine unit and eight 9770-sq. ft. boilers, fired with 50–50 mixture of coke screening and bituminous coal on underfeed stokers; total of 186 boilers are installed at this works; about 80 per cent of all steam is produced from waste fuel.

Waste Prevention. Causes of Waste and Their Prevention, C. F. Wade. Eng. & Boiler House Rev., vol. 39, nos. 9 and 10, Mar. and Apr., 1926, pp. 442–443 and 478–479. Causes of waste on steam plant itself is divided into faults of operation and faults of condition or running and maintenance waste respectively; waste in operation may be caused by faulty firing methods, or by neglect of close air regulation; faulty feed regulation, careless methods of banking fires, excessive blowing down, inaccurate feedwater treatment; faults of maintenance are lack of attention to steam consumption of forced-draft steam jets; leaky blowdown and safety valves; defective and inefficient heat insulation, defective brickwork and baffling, etc.; all of these faults are discussed.

STEAM TURBINES

Exhaust-Steam Utilization. Use of Exhaust Steam Effects Greater Savings, L. Heil. Power Plant Eng., vol. 30, no. 22, Nov. 15, 1926, pp. 1198–1199, 4 figs. Installation of mixed-pressure turbine utilizing exhaust steam from forge shop, earns its cost in $3^1/_4$ yr.

Extraction. Select an Extraction Turbine to Fit the Job, W. Slader. Power, vol. 64, no. 17, Oct. 26, 1926, pp. 618–620, 1 fig. Points out that extraction turbine can effect great savings but it must be designed carefully to fit variations in power and heating demands; shows how to make intelligent study.

Vibrations in. The Gyroscopic Vibration of Marine Steam-Turbine Discs, K. Suyehiro. Engineering, vol. 122, no. 3173, Nov. 5, 1926, pp. 581–582, 4 figs. Deals with effect of yawing or pitching of turbine ship on turbine disks which are thereby set into processional motions. Paper read before Japanese Soc. Nav. Architects.

The Oscillations of Wheels and Blades in Steam Turbines (Die Schwingungen der Räder und Schaufeln in Dampfturbinen), W. Hort. Zeit. des Vereines deutscher Ingenieure, vol. 70, nos. 42 and 23, Oct. 16 and 23, 1926, pp. 1375–1381 and 1419–1424, 60 figs. Causes and effects of oscillations; measurement and calculation of oscillations in turbine disks; calculation of stresses in turbine blades caused by oscillations; means of preventing oscillations.

STEEL

Chrome. See CHROME STEEL.

Embrittlement. Caustic Embrittlement of Steel, S. W. Parr and F. G. Straub. Chem. & Met. Eng., vol. 33, no. 10, Oct. 1926, pp. 604–607, 6 figs. Study of its cause and prevention in boilers reveals valuable data for other chemical engineering applications.

Embrittlement of Steel, A. G. Christie. Mech. Eng., vol. 48, no. 11a, Mid-Nov. 1926, pp. 1368–1372. Review of investigations and opinions on embrittlement of steel used in boilers; progress report of Subcommittee No. 6 of Joint Research Committee on Boiler-Feedwater Studies.

Nickel. See NICKEL STEEL.

Tool. See TOOL STEEL.

STEEL CASTINGS

Annealing. Annealing Steel Castings, L. J. Barton. Foundry, vol. 54, no. 21, Nov. 1, 1926, pp. 854–857, 6 figs. Specifications for steel castings require some kind of heat treatment; this is necessary that castings may be relieved of strains and meet physical tests specified.

STEEL, HEAT TREATMENT OF

Electric. Electric Equipment Reduces Dodge Heat-Treating Costs, W. L. Carver. Automotive Industries, vol. 55, no. 17, Oct. 21, 1926, pp. 686–689, 6 figs. Furnaces in both carburizing and heat-treating departments are electrically heated and major portion of handling work is done by electrically operated machinery; heat loss low.

Gas Application to. Application of Gas to Heat Treatment, M. M. Austin. Gas Age-Rec., vol. 58, no. 15, Oct. 9, 1926, pp. 497–501, 3 figs. Fundamentals of heat-treating theory and practice; specific advantages and limitations of gas compared with other sources of heat; effects of heat on steel. Lecture delivered at Univ. of Ill. See also Am. Gas Jl., vol. 125, no. 14, Oct. 2, 1926, pp. 301–306, 3 figs.

Mechanical Properties, Influence on. The Effects of Heat Treatments Upon the Mechanical Properties of Steels, F. W. Duesing. Mech. World, vol. 80, no. 2078, Oct. 29, 1926, p. 345. Results of tests carried out by author on eight qualities of mild steel. Brief abstract translated from German.

Normalizing and Annealing. Normalizing and Annealing. Machy. (Lond.), vol. 28, no. 729, Sept. 30, 1926, pp. 791–792. Points out that normalizing is very much simpler and cheaper process than oil quenching and tempering; there is only one heating instead of two, and there is not vital necessity for extreme accuracy of temperature control; when annealing proper is substituted for normalizing it is possible that very much worse structure is result.

Principles. Facts and Principles Concerning Steel and Heat Treatment, H. B. Knowlton. Am. Soc. Steel Treating—Trans., vol. 10, no. 4, Oct. 1926, pp. 638–656, 11 figs. Fundamental principles of normalizing, annealing, hardening, tempering and heat treating of low and medium carbon steels; use of critical-range diagrams and charts giving physical properties produced by different heat treatments, are explained; photomicrographs are given to show effects of different heat treatments upon structure of steel.

STOKERS

Lomschakoff. Mechanical Grate for All Kinds of Coal (Vorschubrost für beliebige Kohlensorten), A. Lomschakoff. Wärme, vol. 49, nos. 37 and 38, Sept. 10 and 17, 1926, pp. 651–655 and 676–679, 14 figs. Grate designed by author is characterized by large flat sections with provision for air supply in innumerable fine jets; falling of fuel and ash through grate is prevented, and fuel supply at front of grate is from considerably higher level; it is claimed that mixtures of lump and slack can be burned efficiently without any special precautions. See brief translated abstract in Eng. & Boiler House Rev., vol. 40, no. 5, Nov. 1926, p. 258.

STROBOSCOPES

High-Speed Machines, Measurements on. Optical Measurements on High-Speed Machines (Optische Messungen an schnellaufenden Maschine), W. Kniehahn. Motorwagen, vol. 29, no. 22, Aug. 10, 1926, pp. 505–510, 12 figs. Method of optical measurement which is said to combine advantage of highest accuracy with greatest simplicity; observations involve following points: Do oscillations occur periodically; how great is frequency of oscillations, and in what proportion to periodicity of machine; direction of oscillations, etc.; types of stroboscope used.

T

TERMINALS, LOCOMOTIVE

Turntables. Careful Planning Enables Turntable to Be Renewed in Short Time, H. H. Harsh. Ry. Eng. & Maintenance, vol. 22, no. 10, Oct. 1926, pp. 392–394, 9 figs. Replacement of 80-ft. balancing structure with 115-ft. twin-span type introduces many complications.

TESTING MACHINES

Universal. New "Buckton" Universal Testing Machine. Mech. World, vol. 80, no. 2075, Oct. 8, 1926, p. 280, 1 fig. Details of multiple-lever type capable of testing in tension, deflection or compression any description of materials from nickel-chrome steel to timber.

TEXTILES

Cotton-Rayon Processing. Processing Cotton-Rayon Piece Goods, W. W. Chase. Textile World, vol. 70, no. 15, Oct. 9, 1926, pp. 52–54, 5 figs. Important precautions to be observed by dyer and finisher in handling cotton fabrics with rayon yarns as decorations; scouring and bleaching; drying at low temperatures; mercerizing; dyeing various rayons and combinations; finishing to preserve luster.

Rayon Processes. Oils and Oil Products in Rayon Processes, H. C. Roberts. Textile World, vol. 70, no. 15, Oct. 9, 1926, pp. 57–58, 2 figs. Necessity of lubricants in rayon winding; what rayon lubricant should do; preparing rayon for winding; removal of oil and foreign matters; dyeing light shades with dyebath leveler; softening rayon preparatory to finishing.

TOOL STEEL

Properties. Tool Steel (Werkzeugstahl), R. Schäfer. Wärme, vol. 49, nos. 38 and 39, Sept. 17 and 24, 1926, pp. 669–675 and 689–692, 39 figs. History of development; structure formation of iron and steel in relation to carbon content; critical temperature; change of structure with rising or falling temperature; solid solution; hardening of steel; examples of hardened tools; hardening stresses; surface characteristics of steel products with regard to their stresses; notch hardness; high-speed tool steel.

TOOLS

Box, Roller Supports for. Roller Supports for Box Tools, F. Horner. Can. Machy., vol. 36, no. 17, Oct. 21, 1926, pp. 13–14, 8 figs. When rollers fail to maintain their alignment and position, accuracy of turning is seriously affected and finish poor, crux of matter beginning with frame of box tool.

TURBO-GENERATORS

Large 3000-R.P.M. Largest 3000-R.P.M. Turbo-Generators (Die grössten Turbogeneratoren für 3000 Umdr/min), L. Kropff. Siemens-Zeit., vol. 6, no. 9, Sept. 1926, pp. 426–431, 11 figs. Describes self-ventilated generator for 32,000 kva.; its efficiency at full load and 80-per cent power factor is 95.8 per cent, requiring 80-kw. excitation; dismantling of machine after severe short-circuit test disclosed no noticeable effect upon windings; mechanical overspeed test of 3900 r.p.m. had also no effect upon construction; stator and rotor of generator weight, 80 tons. See brief translated abstract in Elec. World, vol. 88, no. 20, Nov. 13, 1926, p. 1026.

V

VENTILATION

Subways. Ventilating the World's Largest Subaqueous Tube. Heat. & Vent. Mag., vol. 23, no. 10, Oct. 1926, pp. 80–81, 3 figs. System has been worked out for providing continuous supply of fresh air to guard against harmful effects form engine-exhaust gases in Estuary Subway being constructed between Oakland and Alameda, Cal.; use of expansion chamber to hold air under slight head.

VENTURI METERS

Tube Characteristics. Venturi Tube Characteristics, J. W. Ledoux. Am. Soc. Civ. Engrs.—Proc., vol. 52, no. 9, Nov. 1926, pp. 1787–1796, 4 figs. Gives coefficients of discharge and losses of head determined from series of actual tests of 19 tubes ranging in size from 30 to 1 in.; results of tests of 8 tubes, obtained by other experimenters.

W

WAGES

Payment, Principles of. Principles of Wage Payment, A. B. Rich. Taylor Soc.—Bul., vol. 11, no. 4, Oct. 1926, pp. 214–218. Statement advocated by Manufacturers' Research Association; principles include three general types of payment: (1) piece work (general term for payment of individual on basis of amount of production); (2) group piece work; (3) day work.

Piece-Time Rate. Piece-Time—Not Piece Rate, as Basis of Wages (Stückzeit—nicht Stücklohn als Grundlage des Leistungsverdienstes), E. Ruhrmann. Maschinenbau, vol. 5, no. 19, Oct. 7, 1926, pp. 900–901. Discusses disadvantages of piece-rate basis and shows that by piece-time rate they may be overcome and satisfactory economic operation secured.

WASTE ELIMINATION

Employee Coöperation in. Employe Co-Operation in Elimination of Waste in Industry, G. Hodge. Soc. of Indus. Engrs. Bull., vol. 8, no. 9, Sept. 1926, pp. 15–20 and (discussion 20–22. Deals with human factor in industry and its possible values in reducing waste of production.

WATER POWER

European Practice. Some Observations on European Water-Power Practice, A. J. R. Houston. Boston Soc. Civ. Engrs.—Jl., vol. 13, no. 8, Oct. 1926, pp. 329–354 and (discussion) 355–368, 21 figs. Indicates features of European practice brought to author's attention during 3 years of study in Switzerland, France, Germany and Spain; deals with dams, silt-removal basins, tunnels, surge tanks, penstocks and valves, Pelton wheels, low-head dams, reaction turbines, architecture, interconnection and government ownership. Bibliography.

Industrial Uses. Hydroelectric Power in Industry, L. H. Davis. Indus. & Eng. Chem., vol. 18, no. 10, Oct. 1926, pp. 1058–1061. Water-power resources of United States; use of power by electrotechnical and electrometallurgical industries; transmission of power through manufactured commodities.

N.E.L.A. Committee Report. Report of Hydraulic Power Committee 1925–1926. Nat. Elec. Light Assn.—Report, no. 256–26, 30 pp., 24 figs. Reliability of hydroelectric units; forecasting water supply; vibration in hydraulic machinery; restriction in flow due to vegetable and animal growths in conduits; manufacturers' statements regarding developments in hydraulic field.

WATER TREATMENT

Deaeration. Present Methods of Water Deaeration (Die Wasserentgasung der Gegenwart), W. Steinmann. Gas- u. Wasserfach, vol. 69, no. 33, Aug. 14, 1926, pp. 691–694, 1 fig. Vacuum treatment of water; open-air deaeration; removal of CO_2 to extent to render it harmless to marble, mortar or iron; absorption of CO_2 by marble in order to neutralize effect of free aggressive CO_2 in water.

WELDING

Aircraft Parts. See AIRCRAFT CONSTRUCTION MATERIALS, Fusion-Joining.

Electric. See ELECTRIC WELDING; ELECTRIC WELDING, ARC; ELECTRIC WELDING, RESISTANCE.

Filler Rods. Observation Testing of Filler Rod, J. B. Green. Welding Engr., vol. 11, no. 10, Oct. 1926, pp. 50–52. Method of testing which permits welder to determine in rough way operating characteristics and weld properties.

Fusion. Essentials in Fusion Welding, S. W. Miller. Am. Welding Soc.—Jl., vol. 5, no. 9, Sept. 1926, pp. 8–10. Matters that must be given careful attention are design, materials, methods, supervision, training and testing.

High-Chromium Alloys. Welding High-Chromium Alloys, S. M. Norwood. Brass World, vol. 22, no. 10, Oct. 1926, pp. 327–328. Brittleness of alloys containing more than 10 per cent chromium serious problem; addition of 8 per cent nickel improves alloy; other additions suggested.

Iron and Steel. Welding of Iron and Steel, C. A. Adams. Am. Iron & Steel Inst.—Advance Paper, for mtg. Oct. 22, 1926, 71 pp., 51 figs. Discusses different processes of welding; their advantages, limitations and fields of usefulness with particular reference to welding of iron and steel. See also abstract in Iron Age, vol. 118, no. 18, Oct. 28, 1926, pp. 1194–1196.

Oxyacetylene. See OXYACETYLENE WELDING.

WIRE

Steel. The Manufacture of Steel and Iron Wire in Germany, H. Altpeter. Wire, vol. 1, no. 6, Oct. 1926, pp. 194–195 and 212, 4 figs. Types of furnaces and lead baths for heat treatment of wire. Translated from Stahl u. Eisen. See reference to original article in Eng. Index 1925, p. 785.

WIRE DRAWING

Steel. Drawing Steel (Le tréfilage de l'acier), R. Galmard. Technique Moderne, vol. 18, no. 20, Oct. 15, 1926, pp. 614–622, 20 figs. Discusses fundamental phenomena, annealing, hammer hardening, drawing; drawing mills and their equipment, single and multiple drawing; automatic machinery, auxiliaries, etc.

WIRE ROPE

Care and Maintenance. Care and Maintenance of Wire Rope, W. Voigtlander. Blast Furnace & Steel Plant, vol. 14, no. 11, Nov. 1926, pp. 461–46[illegible], 5 figs. How to measure wire rope: uncoiling or unreeling; lubrication; splicing and socketing.

WOOD

Coatings. The value of Paint Primers in Protecting Wood, M. E. Dunlap. Mech. Eng., vol. 48, no. 12, Dec. 1926, pp. 1457–1459, 3 figs. Measuring water resistance of coatings; description of coatings tested; results of tests of priming coats.

Finishing. The Technology of Wood Stains and Fillers for Use with Lacquer, S. M. Silverstein. Mech. Eng., vol. 48, no. 11a, Mid-Nov. 1926, pp. 1293–129[illegible], 3 figs. Importance of fundamental research work on development of sound undercoating materials for use with lacquer; progress in development of non-grain-raising water stains and rapid-drying water-base fillers.

Wood Finishing—A Glance Ahead, F. L. Brown. Mech. Eng., vol. 48, no. 11a, Mid-Nov. 1926, pp. 1286–1288. Wood finishing as art, science and branch of engineering; technical knowledge of wood foundation of wood-finishing engineering; need for methods of measuring service value of finishes.

Structural Properties and Uses. Wood as Structural Material (Holz als Werkstoff), O. Frese. Zeit. des Vereines deutscher Ingenieure, vol. 70, no. 4[illegible], Oct. 9, 1926, pp. 1349–1352. Structure of wood; species of wood employed in Germany, and their properties; properties of wood under influence of locality of tree, climate and moisture content; testing methods for logs and timber; wood impregnation; comparison with iron and light metal with regard to weight and strength; statistics of German wood industry.

WOOD PRESERVATION

Specifications. Wood Preservation. Am. Ry. Eng. Assn.—Bul., vol. 28, no. 288, Aug. 1926, pp. 7[illegible]–129, 13 figs. Specifications for preservative treatment; creosoted piles and timber for use in Atlantic Coast waters infested with marine borers; preservative treatment of Douglas fir; specifications for preservative; method for determining strength of zinc-chloride solution; determination of zinc in treated timbers; forms for reporting inspection.

WOOL

Fibers Under Stress. The Extension of Wool Fibres Under Constant Stress, J. B. Speakman. Textile Inst.—Jl., vol. 17, no. 9, Sept. 1926, pp. T47[illegible]–T481, 6 figs. Present investigation has confirmed views expressed in previous paper concerning gel structure of wool fiber; existence of definite yield point has been demonstrated and occurrence of second point of inflection on stress-strain diagram for wool shown to be independent of rate of loading; existence of gelatinous phase in wood fiber has been confirmed and shown to vary in composition from one wool to another and to change in viscosity with temperature.

THE ENGINEERING INDEX

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Mechanical Engineering Section

THE ENGINEERING INDEX presents each month, in conveniently classified form, items descriptive of the articles appearing in the current issues of the world's engineering and scientific press of particular interest to mechanical engineers. At the end of the year the monthly instalments are combined along with items dealing with civil, electrical, mining, and other branches of engineering, and published in book form, this annual volume having regularly appeared since 1906. In the preparation of the Index by the engineering staff of The American Society of Mechanical Engineers some 1200 technical publications received by the Engineering Societies Library (New York) are regularly reviewed, thus bringing the great resources of that library to the entire engineering profession.

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ACETYLENE

Generators. Acetylene Explosions, Their Cause, Effect and Prevention (Acetylenexplosionen, Ihre Ursache, Wirkung und Verhinderung), J. H. Vogel. Autogene Metallbearbeitung, vol. 19, no. 18, Sept. 15, 1926, pp. 239–252. Reviews recent explosions in Germany; design of acetylene generators; properties of carbide, gasification, contents of dust and impurities, glowing of carbide during gas generation; etc.

AERONAUTICAL INSTRUMENTS

Air-Speed Indicators. Notes on Air Speed Indicators. Aviation, vol. 21, no. 24, Dec. 13, 1926, pp. 1001–1002, 2 figs. Practical information on most used of airplane instruments; information supplied by Pioneer Instrument Co.

AERONAUTICS

Progress in. Progress in Aeronautics. Mech. Eng., vol. 48, no. 12, Dec. 1926, pp. 1432–1434. Progress report contributed by Aeronautics Division of Am. Soc. Mech. Engrs., dealing with Governmental activities, air transport, aids to navigation, aerodynamics, airplane construction, power plant and airships.

AIR CONDITIONING

Chart. A Simplified Air-Conditioning Chart. Heat. & Vent. Mag., vol. 23, no. 12, Dec. 1926, p. 73, 1 fig. Chart for determining heat content of air with varying temperature and moisture conditions has been devised by A. Lewis of Commonwealth Works Department of Australia.

AIRCRAFT

Constructional Engineering. The Constructional Engineering of Aircraft, R. K. Pierson. Instn. Civ. Engrs., 1925, 54 pp., 22 figs. General comparison with normal structural engineering; component parts of aircraft; initial assumptions and limiting conditions; methods of stress calculation; metal construction; special problems.

Floats for. Naval Development of Floats for Aircraft, H. C. Richardson. Soc. Naval Architects & Mar. Engrs.—Advance Paper, no. 2, for mtg. Nov. 11–12, 1926, 12 pp., 20 figs. Review of developments; objections to twin floats; for bombing and torpedo planes twin-float arrangement has afforded most satisfactory solution, though twin-float difficulties are assuming almost prohibitive proportions as size increases.

AIRPLANE ENGINES

Air-Cooled. The Development of the Wright Air-Cooled Aviation Engine, H. C. Dinger. Am. Soc. Naval Engrs.—Jl., vol. 38, no. 4, Nov. 1926, pp. 856–878, 9 figs. Presents various stages of successful development in aircraft engines in United States; this development, initiated for naval purposes, has resulted in producing types of engines widely and successfully used in commercial aviation.

Wasp and Hornet Radial Air-Cooled Aeronautic Engines, G. J. Mead. Soc. Automotive Engrs.—Jl., vol. 19, no. 6, Dec. 1926, pp. 609–615, 14 figs. Design of this engine is characterized by high cooling efficiency, high mean effective pressure, low fuel consumption per hp-hr., light weight, high power output, rigidity and strength of crankcase, maximum accessibility of parts and accessories, easy demountability of crankcase and cylinders from accessories assembly, and complete protection of accessories between crankcase and fire walls of fuselage.

Beardmore. The Beardmore "Cyclone" Aero Engine. Flight, vol. 18, no. 44, Nov. 4, 1926, pp. 717–718, 5 figs. Develops 900 hp. at low speed of 1350 r.p.m., and for this power weight is only 2150 lb.

Cost. Do Airplane Engines Cost Much? Aviation, vol. 21, no. 23, Dec. 6, 1926, pp. 960 and 962, 5 figs. Aircraft engines at $20 per hp. compare favorably with costs in other fields.

Fiat. The 882 H.P. Fiat Aero Engine. Flight, vol. 18, no. 47, Nov. 25, 1926, p. 767, 2 figs. Engine fitted in Macchi low-wing monoplane which won race for Schneider Trophy at Norfolk, Va., is water-cooled 12-cylinder engine of fairly orthodox design.

AIRPLANE PROPELLERS

Metal vs. Wood. Metal v. Wood Propellers. Aviation, vol. 21, no. 22, Nov. 29, 1926, pp. 913–914, 1 fig. Discussion by correspondence between R.B.C. Noorduyn, Atlantic Aircraft Corp., and T. P. Wright, Curtiss Aeroplane and Motor Co.

AIRPLANES

Airfoils. Pressure Distribution Over a U.S.A.-27 Aerofoil with Square Wing Tips—Model Tests, C. G. Heard. Mech. Eng., vol. 48, no. 12, Dec. 1926, pp. 1401–1403, 4 figs. Investigation undertaken to determine distribution of loading over airfoil with square wing tips, tests being conducted in wind tunnel; effect of stagger on distribution of loading is considerable.

Brakes. Sauzedde Airplane Brake Is Built Integral with Wheel, L. S. Gillette. Automotive Industries, vol. 55, no. 23, Dec. 2, 1926, pp. 930–931, 3 figs. Triple-laced wire spoke design used for strength; aluminum drum attaches to flange at rear of hub; separate assembly carries two self-centering, self-energizing brake shoes.

De Havilland. The de Havilland Hercules Air Liner. Aviation, vol. 21, no. 23, Dec. 6, 1926, pp. 958–959, 3 figs. New Imperial Airways 3-engined air liner for Egypt-India air service.

Economy Chart. An Economy Chart for Airplanes, C. H. Powell. Aviation, vol. 21, no. 24, Dec. 13, 1926, pp. 996–998. Effect of wing area on speed, economy and speed range shown diagrammatically.

Flying Boats. See FLYING BOATS.

Gasoline Tanks. Effect of Protruding Gasoline Tanks upon the Characteristics of an Airfoil, E. N. Jacobs. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 249, Oct. 1926, 2 pp., 3 figs. Uncertainty as to effect of gasoline tank protruding from center section of wing upon aerodynamic characteristics of wing has led to testing of such arrangement in variable-density wind tunnel; particular case investigated indicates that detrimental effect is less when object protrudes from lower surface.

Light. Lightplanes and Private Flying. Aviation, vol. 21, no. 24, Dec. 13, 1926, pp. 999–1000, 2 figs. Low-powered flying as basis upon which cheap airplanes may be produced.

Measuring Distance Above Ground. Method for Measuring Distance of Airplane from Ground by Electric Means (Verfahren zur Messung des Abstandes eines Flugzeuges von der Erdoberfläche auf elektrischem Wege), H. List. Luftfahrt, vol. 30, no. 21, Nov. 5, 1926, pp. 323–324, 2 figs. Method depending on measuring capacity of airplane and of auxiliary surface at axles of wheels with respect to ground, which give very accurate data for landing.

Paris Show. The Paris Aero Show 1926. Flight, vol. 18, no. 48, Dec. 2, 1926, pp. 775–786, 33 figs. Review of exhibits, alphabetically arranged according to makers.

Quantity Production. Airplane Production Moving Slowly Toward Quantity Basis, A. F. Denham. Automotive Industries, vol. 55, no. 24, Dec. 9, 1926, pp. 962–964, 5 figs. Modified progressive-assembly line system now used in steel-tubing fuselage construction; development of machine methods will reduce costs materially; hard tubing difficult to work.

Rohrbach-Roland. The New Three-Engine Rohrbach-Roland Monoplane (Der neue dreimotorige Rohrbach-Roland-Verkehrseindecker). Luftfahrt, vol. 30, no. 19, Oct. 5, 1926, pp. 293–295, 6 figs. New commercial airplane built entirely of duralumin; three 250-hp. water-cooled BMW IV engines; speed 200 km. per hr.; accommodation for ten passengers.

Seaplanes. See SEAPLANES.

Speed Control. Indicators or Controls for Speed Loss (Les appareils avertisseurs ou correcteurs de perte de vitesse), P. Mazer. Aérotechnique, vol. 8, no. 89, Oct. 1926, pp. 333–338, 5 figs. Describes Constantin indicator, double-face horizontal vane mounted on an articulated trapezium, being very sensitive to small variations; Constantin vane acting on depth control; Savage-Bramson vane. See also Aérophile, Sept. 15, 1926, p. 277.

Sport. The Lizette Sport Plane. Aviation, vol. 21, no. 22, Nov. 29, 1926, pp. 918–920, 4 figs. New low-powered two-seater plane, or parasol monoplane, with semi-internally braced wings.

Steam-Driven. Is the Steam-Driven Airplane Possible? (L'avion à vapeur est-il possible?), H. Robart. Aérophile, vol. 34, no. 17–18, Sept. 1–15, 1926, pp. 275–276. Author believes that steam drive is possible and discusses advantages over gasoline drive.

Wings. Internally Trussed Wings (Flugelkörper ohne äusseres Tragwerk), H. Reissner. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 17, no. 20, Oct. 28, 1926, pp. 384–393, 5 figs. Investigation of stress conditions in wings without external bracing.

AIRSHIPS

L. Z. 127. The New Zeppelin L. Z. 127 (Das neue Luftschiff "L. Z. 127"), W. Scherz. Luftfahrt, vol. 30, no. 18, Sept. 20, 1926, p. 276. Details of improvements proposed for new Zeppelin 235 m. long, 30 m. maximum diameter and 105,000 cu m. capacity, using 5-12-cylinder Maybach engines developing 800 to 1000 hp., burning hydrocarbon gas mixture of low inflammability and specific gravity of air; intended for Transatlantic service.

6,000,000-Cu. Ft. New 6,000,000 Cubic-Foot Airships for our Navy, C. P. Burgess. Sci. Am., vol. 135, no. 6, Dec. 1926, pp. 418–419, 5 figs. These ships, specially designed for helium inflation, will have engines mounted internally, thereby reducing head resistance.

ALLOYS

Aluminum. See ALUMINUM ALLOYS; ALUMINUM BRONZE.

Brass. See BRASS.

Bronzes. See BRONZES.

NOTE.—The abbreviations used in indexing are as follows:

Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

Copper. See COPPER ALLOYS; BRASS; BRONZES.

High-Temperature-Resisting. High-Temperature-Resisting Alloys (Hochhitsebeständige Legierungen), A. Fry. Kruppsche Monatshefte, no. 7, Oct. 1926, pp. 154–172, 9 figs. Details of Ferrotherm, Nichrotherm and Nialit alloys made and patented by Krupps with coefficient of heat transmission of 15 to 25, for temperatures of up to 1100 deg. cent.

Iron. See IRON ALLOYS.

Ludwig-Soret Effect. The Ludwig-Soret Phenomenon in Alloys (Le phénomène de Ludwig-Soret dans les alliages), M. Ballay. Académie des Sciences—Comptes Rendus, vol. 183, no. 15, Oct. 11, 1926, pp. 603–611. Experiments carried out which show that Ludwig-Soret effect—segregation due to unequal heating of melts—is clearly established for liquid and for solid alloys.

ALUMINUM ALLOYS

Aluminum Bronze. See ALUMINUM BRONZE.

Aluminum-Calcium-Silicon. The Aluminum-Calcium-Silicon System (Ueber das System Aluminium-Kalzium-Silizium), G. Doan. Zeit. für Metallkunde, vol. 18, no. 11, Nov. 1926, pp. 350–355, 15 figs. Tests to determine possibility of improving aluminum by addition of calcium and silicon, in similar manner as by addition of magnesium and silicon; reactions in ternary system Al–Ca–Si; burning out of calcium in melting process; behavior of CaSi.

Aluminum-Magnesium-Cadmium. Study of Ternary Alloys (Contribution à l'étude des alliages ternaires), J. Valentin. Revue de Métallurgie, vol. 23, nos. 4 and 5, Apr. and May 1926, pp. 209–218 and 295–314, 27 figs. Experiments on alloys of aluminum, magnesium and cadmium; tests after various heat treatments; solidification; experiments are summed up in triangular diagram. See brief translated abstract in Brass World, vol. 22, no. 11, Nov. 1926, p. 361.

Heat Treatment. A Rapid Method for the Heat Treatment of the Aluminum-Copper-Nickel-Magnesium (Piston) Alloy, S. Daniels. Am. Soc. Steel Treat.—Trans., vol. 10, no. 6, Dec. 1926, pp. 872–882. Outlines principles of heat treatment of "Y" alloy, together with course of experimentation that led to adoption of two-hour treatment which increased strength of alloy as cast from 25,000 to 35,000 lb. per sq. in., and Brinell hardness from 74 to 105; effect of time at soaking temperature, quenching medium, aging temperature and period, and influence of cross-section upon mechanical properties.

Properties. Useful Alloys of Aluminum and Their Properties, G. R. Webster. Foundry Trade Jl., vol. 34, no. 533, Nov. 4, 1926, p. 393. Properties of different alloys of aluminum, which are divided into three general groups: (1) aluminum with not more than 10 to 25 per cent of added metals; (2) metals containing not more than 10 to 15 per cent of aluminum; (3) alloys of rare metals with aluminum containing from 0.5 to 5.0 per cent of added metal.

Sand-Cast. Properties of Some Sand-Cast Aluminum-Magnesium Silicide Alloys, S. Daniels. Indus. & Eng. Chem., vol. 18, no. 12, Dec. 1926, pp. 1280–1285, 14 figs. When quenched and artificially aged those quasi-binary alloys which contain from 1.25 to 1.75 per cent of this compound, develop excellent combination of strength and ductility; benefits to be derived from heat treatment of such alloys are to be utilized rather in wrought materials; describes metallography.

ALUMINUM BRONZE

Properties. Aluminum Bronze—An Acid Resisting Material, W. M. Corse. Am. Soc. Steel Treat.—Trans. vol. 10, no. 6, Dec. 1926, pp. 898–905. Practically important aluminum bronzes are those containing less than 11 per cent aluminum; they possess, in addition to tensile properties of medium steel, far greater resistance to corrosion, wear and fatigue than such steel; aluminum bronze may be forged and machined with practically same equipment as for steel, and with proper care and fluxes it may be welded; properly designed castings have been made to stand hydraulic pressure of 1000 lb. per sq. in.

AUTOMOBILE ENGINES

Design. Engine Characteristics as Affected by Cylinder and Crankcase Arrangement, H. M. Crane Soc. Automotive Engrs.—Jl., vol. 19, no. 6, Dec. 1926, pp. 578–592 and (discussion) 592–594, 23 figs. Explains characteristics and advantages of different types of engine; author endeavors to determine, if possible, what salable article will be several years hence; consideration of noise due to vibration of engine.

Efficiency Gain. Engine Efficiency Gain of 20% Now in Sight, P. M. Heldt. Automotive Industries, vol. 55, no. 21, Nov. 18, 1926, pp. 844–847, 5 figs. Compression ratio of 7 to 1 practicable with anti-knock fuels; super-expansion idea shown to be of small value.

Machining. How Production Methods Vary in Shops Building "Light Sixes," F. H. Colvin. Am. Mach. vol. 65, nos. 4, 5, 6, 7, 8, 9, 10, 11, 13, 15, 16, 20 and 22, July 22, 29, Aug. 5, 12, 19, 26, Sept. 2, 9, 23, Oct. 7, 14, Nov. 11 and 25, 1926, pp. 153–155, 199–202, 235–238, 273–274, 319–321, 363–364, 403–404, 449–450, 515–516, 599–600, 631–632, 785–786 and 869, 74 figs. July 22: Cylinder blocks for Oakland Six. July 29: Tools and fixtures for Cleveland Six; Aug. 5: Operations on cylinder blocks and heads for Overland "Light Six." Aug. 12: Clamping and locating devices for cylinder heads; special milling heads and rotary tables. Aug. 19: Tools, fixtures and methods used in machining crankcases. Aug. 26: Fixtures for centering and holding crankcases; devices for insuring alignment when Cleveland parts go to assembly; Sept. 2: Tools and fixtures for making pistons for Oakland Light Six; boring and reaming pin holes. Sept. 9: Machining of flywheels for Willys-Knight and Overland engines at plant of Wilson Foundry and Machine Co., Pontiac, Mich. Sept. 23: Putting finishing touches on connecting rods. Oct. 7: Crankpin ends of Overland "Six" connecting rods broached without being bored; babbitting by centrifugal method. Oct. 14: Machining of transmission case of Cleveland car. Nov. 11: Methods used in holding awkward shaped piece for various machining operations in Cleveland plant; standard machines used. Nov. 25: Assembling operations of Overland Six engine.

Testing. New Engine-Testing Forms. Soc. Automotive Engrs.—Jl., vol. 19, no. 6, Dec. 1926, pp. 556–558, 5 figs. Charts proposed by S.A.E. Engine Division which will be applicable to all internal-combustion engine types.

Tylor. The Latest Tylor Engine. Motor Transport, vol. 43, no. 1132, Nov. 22, 1926, pp. 627–628, 5 figs. Details of Tylor Tiger 4-cylinder engine so made that it can be dropped into place in any chassis from which J. B. 4-type engine of same make has been removed.

Wear and Corrosion. Causes of Wear and Corrosion in Engines, O. M. Burkhardt. Soc. Automotive Engrs.—Jl., vol. 19, no. 6, Dec. 1926, pp. 657–680 and (discussion) 682–684, 18 figs. Study of analyses obtained from 656 samples of contaminated crankcase-oil and results of coöperative research.

AUTOMOBILE MANUFACTURING PLANTS

Germany. Workshops of the German Automobile Industry (Arbeitsstätten des Deutschen Automobilbauses). Werkstattstechnik, vol. 20, no. 20, Oct. 15, 1926, pp. 608–635, 100 figs. Editorial report on methods of quantity production at Opel and Reichstein works; Hanomag small-car production; Maybach Engine works; Daimler Works, etc.; equipment, assembly, machine tools, etc.

Organization. Modern Organization of Production in a German Automobile Plant (Zeitgemässe Betriebsorganisation in einer Deutschen Automobilfabrik), G. Schlesinger. Werkstattstechnik, vol. 20, no. 20, Oct. 15, 1926, pp. 601–608, 5 figs. Discusses continuous assembly and describes reorganization of Horch works in Zwickau, from storage of materials to finished product; accounting, cost of production, etc.

AUTOMOBILES

Arab. The Arab—A Newcomer. Autocar, vol. 57, no. 1620, Nov. 19, 1926, pp. 978–980, 8 figs. Four-cylinder, two-liter, high-performance chassis.

Berlin Show. The Berlin Show. Autocar, vol. 57, no. 1618, Nov. 5, 1926, pp. 900–901, 6 figs. Purely national in character, German display indicates popularity of 6-cylinder engines; front-driven Rumpler outstanding novelty.

Brakes, Four-Wheel. Present-Day Brakes. Autocar, vol. 57, no. 1615 and 1616, Oct. 15 and 22, 1926, pp. 641–645 and 758–761, 18 figs. Consideration of principles and details underlying latest types of British, American, and Continental 4-wheel braking systems.

Charcoal-Gas Producers for. Competition in Charcoal Production and by Vehicles Driven by Producer Gas (Le Concours de Carbonisation en foret at le rallye pour véhicules à gazogène effectué dans le Sud-Ouest), M. Guilleaume. Industrie des Voies Ferrées et des Transports Automobiles, vol. 20, no. 237, Sept. 1926, pp. 394–410, 28 figs. Construction and operation of Delhommeau, Trihau, Landais and Barbier charcoal furnaces, and wood-burning gas producers by Berliet also used for vehicles; summarizes question of charcoal vs. wood as fuel.

Constantinesco Converter. The 5 H.P. Constantinesco Chassis. Automobile Engr., vol. 16, no. 223, Dec. 1926, pp. 474–479, 10 figs. Construction of converter and design of motor vehicle fitted therewith; chassis is one in which prime mover is combined with patented mechanism that converts virtually constant torque of ordinary gasoline engine to varying torque as required by varying conditions of car load and of road. See description in Auto-Motor Jl., vol. 31, no. 48, Dec. 16, 1926, pp. 1035–1037, 9 figs.

Delaunay-Belleville. A New 14-40 H.P. Delaunay-Belleville. Auto-Motor Jl., vol. 31, no. 1350, Nov. 18, 1926, pp. 951–954, 11 figs. Particulars of new French chassis with overhead valves and 4-wheel braking system.

Front-End Drive. The H. S. W. Automobile with Front-End Drive (Der 4/20 PS SHW-Wagen mit Vorderradantrieb), K. F. Nägele. Motorwagen, vol. 29, nos. 29 and 32, Oct. 20 and Nov. 20, 1926, pp. 703–705 and 803–807, 18 figs. Radical design developed by Schwäbische Huettenwerke; car has front-end drive and consequently can be built extremely low; body and chassis are one light-metal unit; wheels are directly attached to reinforced parts of body and are carried on encased coil springs; drive to front wheels is through center of spring housing; this arrangement obviates universal joints to large extent.

Gear Boxes. Gear Box with Constant Mesh Pinions. Engineering, vol. 122, no. 3175, Nov. 19, 1926, pp. 646–647, 1 fig. Details of type manufactured by Lea and Francis, Coventry.

German Design. German Design Greatly Modernized During Past Year, E. P. A. Heinze. Automotive Industries, vol. 55, no. 24, Dec. 9, 1926, pp. 958–960, 4 figs. Close attention given to detail improvements; general trend is toward greater comfort, reliability and silence; 14 of 17 new models are sixes; 4-cylinder engines are disappearing.

Hanomag. The Hanomag Automobile (Das Hanomag-Auto). Motorwagen, vol. 29, no. 29, Oct. 20, 1926, p. 726. Car costs about $625 and is in position to undersell any foreign car in Germany; it has engine with only one cylinder; vehicles for all purposes, from sedans and taxis to delivery trucks, are being manufactured.

The Hanomag Small Car (Vom HANOMAG-Kleinauto), W. Dette. Hanomag Nachrichten, vol. 13, no. 154–155, Aug.-Sept. 1926, pp. 97–107, 24 figs. Equipped with Pallas atomizer, water-cooled single-cylinder 4-stroke engine; details of couplings, speed changes, chassis, brakes, etc.; quantity production.

La Fitte. The La Fitte Light Car. Auto-Motor Jl., vol. 31, no. 46, Dec. 2, 1926, pp. 995–997, 6 figs. 100-lb. car with novel power and transmission mechanism.

McCurd. The New McCurd. Motor Transport, vol. 43, no. 1132, Nov. 22, 1926, pp. 622–624, 6 figs. Passenger chassis of advanced design affording exceptional degree of accessibility for adjustments and repairs.

Mercédès. The 6-Liter Mercédès Supercharging Sport Car (Die 6-Liter-Mercedes-Kompressorsportwagen). Motorwagen. vol. 29, no. 30, Oct. 31, 1926, pp. 758–763, 13 figs. Details of supercharger, carburetor, etc.

The 33-180 H.P. Mercédès. Auto Motor Jl., vol. 31, no. 43, Nov. 11, 1926, pp. 929–931, 7 figs. Six-liter car with latest development of supercharger; details of braking and suspension.

Napier-Campbell. The Napier-Campbell Car. Auto-Motor Jl., vol. 31, no. 46, Dec. 2, 1926, pp. 991–992, 7 figs. Vehicle, fitted with 12-cylinder airplane engine, specially built for record breaking.

Olympia Show, England. Motor Show at Olympia. Automobile Engr., vol. 16, no. 221, Nov. 11, 1926. This is special number with following sections: Show Review, p. 396; Engines, pp. 397–411, 33 figs; Carburation and Manifolding, pp. 411–416, 18 figs.; Clutches, pp. 416–417, 3 figs.; Gear Boxes, pp. 417–421, 16 figs.; Rear Axles, pp. 421–423, 7 figs.; Brakes, pp. 423–427, 12 figs.; Suspension, pp. 428–430, 9 figs.; Frames, pp. 430–432, 9 figs.; Tools and Accessories, pp. 433–434, 3 figs.

Olympia Motor Show 1926. Auto-Motor Jl., vol. 31, no. 41, Oct. 28, 1926, pp. 867–886, 80 figs. Record of principal chassis and car exhibits based upon stand-to-stand tour of Olympia; articles are placed under name of car dealt with rather than that of firm making it, and have been arranged in alphabetical order with sketches and photographs relating to them.

Paris Show. Twentieth Automobile and Cycle Show [Le XX Salon de l'Automobile et du Cycle Vehicules de Tourisme (Paris, 7–17 Octobre 1926)], G. Delanghe. Génie Civil, vol. 89, nos. 16, 17 and 18, Oct. 16, 23 and 30, 1926, pp. 309–324, 348–355 and 370–382, 103 figs. Reviews recent developments in French industry; describes exhibits, including types of motorcycles, light and medium cars; types of chassis engines, brakes, etc.; high-power cars and equipment.

Twentieth International Automobile Show (La XX^{e} Exposition Internationale de l'Automobile les Véhicules de Tourisme), C. Martinot-Lagarde. Technique Moderne, vol. 18, no. 22, Nov. 15, 1926, pp. 679–684, 13 figs. Describes 4-, 6- and 8-cylinder engines and accessories; chassis and car bodies, suspensions, etc.

Peugeot. The 13-35 H.P. Peugeot Car. Auto-Motor Jl., vol. 31, no. 42, Nov. 4, 1926, pp. 907–910, 14 figs. Engine is of monobloc construction and has clutch and gear integral as unit; head is detachable but valves are at side and driven by side camshaft; cooling is thermosiphonically effected.

Rear-Axle Housing. The Automobile Rear Axle Housing, R. L. Rolf. Forging—Stamping—Heat Treating, vol. 12, no. 11, Nov. 1926, pp. 408–412, 20 figs. Deals with pressed-steel housings.

Shock Vibrations. Fundamentals in Determination of Dynamic Stress of Automobiles under Shock (Grundlagen zur Ermittlung der dynamischen Beanspruchung von Kraftfahrzeugen bei Stössen), Marquard. Motorwagen, vol. 29, nos. 30 and 32, Oct. 31, Nov. 20, 1926, pp. 737–742 and 793–798, 19 figs. Experimental determination of axial and framework vibration diagrams; shows how such diagrams for a given case can be graphically built up, based on purely theoretical principles.

Singer. The "Junior" Singer. Auto-Motor Jl., vol. 31, no. 1351, Nov. 25, 1926, pp. 973–975, 11 figs. Four-cylinder engine is rated at 8 hp. and has wheelbase of 7 ft. 6 in.; engine, clutch and gear form single power and transmission unit.

Small High-Performance. The High-Performance Small Car Here and Abroad, T. J. Litle, Jr. Soc. Automotive Engrs.—Jl., vol. 19, no. 6, Dec. 1926, pp. 623–624. In author's belief, America will not copy foreign car, although good features of many foreign designs are recognized; he predicts that influence of racing-engine development will be felt and that present ideas of engine building will be entirely changed on account of wonderful performance of racing cars, result being small high-speed high-power passenger-car engine operating at speed of at least 4000 r.p.m.

Springs. Springs from Automotive Viewpoint. Soc. Automotive Engrs.—Jl., vol. 19, no. 6, Dec. 1926, pp. 543–546, 2 figs. Experimental determination of stresses in leaf springs; fatigue-test results not adequately interpreted; standardization and research accomplished; dynamical problems of spring suspensions; elastic problems. Report prepared for Special Research Committee on Mechanical Springs.

Steam-Driven. The Steam Car, W. H. Johnson. Autocar, vol. 57, no. 1621, Nov. 26, 1926, pp. 1014–1015. Notes on both sides of argument regarding development of external-combustion engine touring car.

Three-Wheel. The Three-Wheel Automobile (Der Dreirad-Kraftwagen), H. R. Müller. Fördertechnik u. Frachtverkehr, vol. 19, no. 23, Nov. 12, 1926, pp. 351–353, 4 figs. Advantages and disadvantages; describes Universelle type by J. C. Müller Co. in Dresden, used mainly as delivery cart, and its equipment.

AUTOMOTIVE FUELS

Anti-Knock Compounds. Retarding Effect of Anti-Detonating Materials (Sur l'effet retardateur d'inflammation produit par les corps dits antidétonants), M. Dumanois. Académie des Sciences—Comptes Rendus, vol. 182, no. 25, June 21, 1926, pp. 1526–1528. Action of anti-detonator may be regarded as raising minimum temperature necessary for spontaneous ignition to occur, or as increasing time necessary for such ignition to occur at any given temperature above minimum; latter would appear to be more logical and is supported by experiments; experiments made with addition of tetraethyl lead to fuel in proportion of 1 part in 1000, by volume, indicate considerable delaying effect on preignition.

Research. Fuel and Lubrication Research, W. A. Whatmough. Automobile Engr., vol. 16, no. 222, Nov. 1926, pp. 449–451, 2 figs. Explanatory résumé of recent investigations in carburation and oils.

Volatility. Increasing Volatility of Motor Fuel. Oil and Gas Jl., vol. 25, no. 26, Nov. 18, 1926, pp. 41 and 133–134, 11 figs. Review of research work covering ease of starting, acceleration, engine performance; discusses use of natural gasoline. Paper read before Nat. Petroleum Marketers Assn.

AVIATION

Freight Containers in Transport. Freight Containers in Air Transport, A. Black. Aviation, vol. 21, no. 25, Dec. 20, 1926, pp. 1038–1039, 3 figs. Problems in handling of loose packages; advantages of using containers; reduction of claims for damage or loss, simplification of handling and loading.

Landing Fields. Central Landing Field in Berlin (Der Zentralflughafen Berlin), Sauernheimer. Zeit. des Vereines deutscher Ingenieure, vol. 70, no. 46, Nov. 13, 1926, pp. 1549–1557, 23 figs. Development of aerial transport; landing field on Tempelhofer Feld and its technical equipment, including hangars, hangar doors, fuel tanks and signals. See also description by Leo, of Hamburg land field at Fuhlsbüttel, pp. 1557–1559, 15 figs.

Lighting of Obstructions. The Lighting of Obstructions Dangerous to Aerial Navigation, C. H. Biddlecombe. Aviation, vol. 21, no. 22, Nov. 29, 1926, pp. 910–912, 1 fig. Author recounts phase of his activities in development of Air Transportation under British government, namely, marking of "reefs of the air," these being tall radio masts, lofty chimneys and similar obstructions on and near airdomes and air routes.

B

BALLISTICS

Bullets in Flight. Air Disturbances Round Bullets in Flight. Engineering, vol. 122, no. 3176, Nov. 26, 1926, p. 657, 3 figs. Describes shadowgraph method introduced by C. V. Boys, and used by T. Harris, J. T. Harris and J. J. Hedges of Woolrich Research Department.

BEAMS

Curved. Tests and Theory of Curved Beams, A. M. Winslow and H. G. Edmonds. Am. Soc. Mech. Engrs.—Advance Paper, for mtg. Dec. 6–9, 1926, 19 pp., 8 figs. Tests consist of strain-gage observations at several points throughout cross-sections of large steel specimens, determining complete strain curves; radial strains, apparently not previously investigated, are definitely measured and simple working theory of radial stress is developed; stress in radial direction is shown to be vital factor in design of curved beams of certain proportions; investigates different theories of circumferential stress.

BEARING METALS

Properties. Bearing Metals, W. T. Griffiths. Inst. Mar. Engrs.—Trans., vol. 38, Sept. 1926, pp. 180–200 and (discussion) 200–207, 16 figs. Deals with tin-base, lead-base, and copper-base alloys; effect of casting on microstructure; testing; lubrication.

BEARINGS

Lubrication. The Lubrication of Waste-Packed Bearings, G. B. Karelitz. Am. Soc. Mech. Engrs.—Advance Paper, for mtg. Dec. 6–9, 1926, 31 pp., 25 figs. Results of investigation made by Westinghouse Electric and Manufacturing Co.; discusses feeding of oil through waste and existence of load carrying oil film in such bearings as essential for their proper performance; observations on friction and temperature of these bearings and on importance of proper packing to insure sealing window by oil-saturated waste; discusses existence of critical oil lift at which seal is broken; reason for occasional end wear and scoring of ends of shell during running-in period.

BEARINGS, BALL

Capacity Formula. New Constants Determined for Ball Bearing Capacity Formula, S. R. Treves. Automotive Industries, vol. 55, no. 25, Dec. 16, 1926, pp. 1014–1016, 4 figs. Constants are dependent upon nature of rolling surface, whether concave, plane or convex, and upon rolling speed and diameter of balls; values based on experimental data.

BEARINGS, ROLLER

Heating and Annealing. Timken Bearings and Gas Furnaces, F. W. Manker. Iron Age, vol. 118, no. 23, Dec. 2, 1926, pp. 1549–1551, 5 figs. Data on fuel consumption and other features of heating and annealing practice; scrap reclamation by briquetting.

Tub-Axle. The Grainer Tub-Axle Roller Bearing Iron & Coal Trades Rev., vol. 113, no. 3064, Nov. 19, 1926, p. 765, 2 figs. Bearing is practically totally enclosed and required filling with grease at rate of 4 oz. per bearing; bearing may or may not be offset.

BELT DRIVE

Short-Center. Reliable Belt Drives Where Centers are Short, S. Rice. Belting, vol. 29, no. 5, Nov. 1926, pp. 22–24, 3 figs. Belt of new construction with narrow strips of specially tanned leather on pulley side; these belts are widely used on drives where center distance between pulleys is short.

Texrope. The Allis Texrope Drive. Mech. World, vol. 80, no. 2082, Nov. 26, 1926, p. 426, 2 figs. Drive was originally developed to meet demand for suitable drive for textile machinery, where smooth resilient, yet positive transmission is necessary to avoid thread breakages, and maintain proper speed for required output; belt is of trapezoidal section and is of cotton impregnated with rubber.

BELTING

Creep and Slip. Distribution of Belt Creep and Slip, R. F. Jones. Am. Soc. Mech. Engrs.—Advance Paper, for mtg. Dec. 6–9, 1926, 18 pp., 20 figs. Explains stroboscope slip meter used in tests and method followed by investigators as well as theory involved; results show that arc over which belt creeps, starts at last point of contact and extends in direction opposite to rotation, amount depending on load; greatest slip always occurs at last point of contact; amount of load that can be carried by given belt under given conditions at merging point of slip and creep varies with coefficient of friction.

BOILER FEEDWATER

Analysis. Composition of Water and Injurious Constituents it Contains (Composition des eaux naturelles et elements nuisibles qu'elles peuvent contenir), J. Guth. Assns. Francaises de Propriétaires d'Appareils à Vapeur—Bul., no. 25, July 1926, pp. 161–180, 3 figs. Discusses chemical constituents of water and importance of accurate analysis; gases, minerals and organic compounds; water hardness, temporary and permanent; typical feedwater analysis.

Hydrogen-Ion Control. Automatic Hydrogen-Ion Control of Boiler Feed Water, H. C. Parker and W. N. Greer. Am. Water Wks. Assn.—Jl., vol. 16, no. 5, Nov 1926, pp. 602–616, 7 figs. Presents facts which indicate that control by H-ion measurements is most logical systematic method of treating boiler feedwater; describes practical installation of this control and its method of operation; advantages gained; control by H-ion measurements is cheapest systematic method of treatment, and it requires least amount of attention; it is only method which automatically compensates for condenser leakage, and provides method for prevention of corrosion in preheating sections and feed lines.

Regulators. The "Drayton" Boiler-Feed Controller. Mech. World, vol. 80, no. 2080, Nov. 12, 1926, p. 387, 2 figs. Apparatus comprises two units, regulator and feed valve; former consists of thermostat encased in inclined steel tube; feed valve is of balanced double-beat type.

Treatment. Railroad Water Treatment. West. Soc. Engrs.—Jl., vol. 31, no. 10, Oct. 1926, pp. 392–402 and (discussion) 402–407. Contains three papers giving general view of water-treating practice on American railroads, as follows: History and Growth of Water Treatment for Locomotive Boilers, R. E. Coughlan; General Aspects of Water Treatment for Railroads, R. C. Bardwell; Zeolite Method of Water Softening, C. W. Sturdevant.

BOILER FURNACES

Grate Bars. Results of Investigations of Grate Bars (Ergebnisse von Untersuchungen an Roststäben), Kühnel. Giesserei, vol. 13, no. 43, Oct. 22, 1926, pp. 809–815 and (discussion) 815–818, 16 figs. Review of recent large-scale investigations; results of author's tests on bars with varying phosphorus content; sulphur enrichment; main zone of destruction lies only in path of combustion and extends over a depth not exceeding 1 cm.

Heat Loss through Moisture in Air. The Influence of Moisture Content of Air on Results of Furnace Investigation (Der Einfluss des Feuchtigkeitsgehaltes der Luft auf die Ergebnisse der Feuerungsuntersuchung), H. Collischonn. Archiv für Wärmewirtschaft, vol. 7, no. 11, Nov. 1926, p. 312. Points out that influence of moisture in air is so slight that it can be disregarded in evaluation of results of furnace investigation.

Radiation, Influence of. The Influence of Radiation in Coal-Fired Furnaces on Boiler-Surface Requirements, and a Simplified Method for its Calculation, W. J. Wohlenberg and E. L. Lindseth. Am. Soc. Mech. Engrs.—Advance Paper, for mtg. Dec. 6–9, 1926, 86 pp., 46 figs. Includes simplified method of dealing with energy problems of boiler furnace; application yields information concerning that division of total surface between cold furnace walls and convection zone which results in greatest overall energy absorption; influences of fuel type, air preheat, and certain other factors on furnace conditions and surface requirements.

Temperature Calculation. Furnace Temperature and Maximum Boiler Efficiency (Feuerraumtemperature und Höchstleistung der Dampfkessel), N. Forssblad. Elektrizitätswirtschaft, vol. 25, no. 417, Sept. 2, 1926, pp. 404–406. Graphical method for determining in advance temperature in furnace; curve diagrams show great effect of heat radiation in furnace on boiler efficiency.

BOILER PLANTS

Automatic. An Automatic Boiler Plant, H. G. Lykken. Power, vol. 64, no. 23, Dec. 7, 1926, p. 864, 1 fig. Entire power load of flour mill in New Prague, Minn., is carried by bent-tube boiler having 4510 sq. ft. of steam-making surface, which is operated at 150 per cent of rating.

Pulverized-Coal. A New Pulverized Fuel Burning Installation. Colliery Guardian, vol. 132, no. 3439, Nov. 26, 1926, pp. 1162–1163, 4 figs. Combination of "Woodeson" watertube boiler and "Unit" pulverizer at Victoria Works of Clarke, Chapman & Co.

Reconstruction. Increasing Efficiency by Reconstructing Existing Boiler plants (Leistungssteigerung im Dampfkesselbau durch Umbau bestehender Kesselanlagen), M. Wintermeyer. Brennstoff- u. Wärmewirtschaft, vol. 8, no. 19, Oct. 1, 1926, pp. 313–316, 3 figs. Addition of pulverized coal to grate firing; addition of high-pressure boiler; firing fire-tube boilers with coke-oven gas, etc.

BOILER PLATE

Crack Formation. Crack Formation in Boiler Plates, Causes and Prevention (Rissbildung in Kesselblechen, ihre Ursachen und ihre Verhütung), Starck. Archiv für Wärmewirtschaft, vol. 7, nos. 7, 10 and 11, July, Oct. and Nov., 1926, pp. 181–188, 292–296 and 321–323, 31 figs. Discusses blue heat and recrystallization as causes of cracking, fractures at critical temperature in cold-worked boiler parts, crack formation in riveted joints of straps and shells; blue brittleness can be avoided by avoiding working at blue heat; structure and resistance to deformation in connection with crack formation; conclusions.

BOILER TUBES

Elevated Temperatures. Properties of Boiler Tubing at Elevated Temperatures Determined by Expansion Tests, A. E. White and C. L. Clark. Am. Soc. Mech. Engrs.—Advance Paper, for mtg. Dec. 6–9, 1926, 17 pp., 16 figs. Investigation to determine safe working loads for low-carbon steel seamless tubing at elevated temperatures; there is increasing tendency to increase both temperature and pressure, but little is known of properties of metals at elevated temperatures, particularly when temperatures are maintained for long periods of time; sets forth preliminary findings on 0.13 carbon-steel tubing when loaded at temperatures of 900, 1000, 1250 and 1500 deg. fahr.

BOILERS

A.S.M.E. Codes. Revisions and Addenda to Boiler Construction Code. Mech. Eng., vol. 48, no. 12, Dec. 1926, pp. 1474–1478, 1 fig. Specifications for carbon-steel castings for valves, flanges and fittings for high-temperature service; specifications for carbon-steel and alloy-steel forgings.

Design. Boiler Design in United States and Germany (La construction des chaudières aux Etats-Unis et en Allemagne), R. Maufroy. Revue de Métallurgie, vol. 23, nos. 8 and 9, Aug. and Sept. 1926, pp. 433–442 and 498–506, 14 figs. American and German practice; types of boilers, economizers and air preheaters, superheating and cooling, mercury-vapor boilers; furnaces and combustion; comparative costs of operation; cracks in rivet seams; Münziger's report and American Progress.

Heads. The Problem of Boiler Heads, with Special Regard to Pressure Vessels and Apparatus (Zur Frage der Kesselböden, insbesondere mit Rücksicht auf den Dampffass- und Apparatebau), G. Hönnicke. Wärme, vol. 49, nos. 41 and 42, Oct. 8 and 15, 1926, pp. 719–723 and 741–744, 17 figs. Aspects to be taken into consideration with pressure vessels and apparatus; discusses different shapes of heads; stresses in dished heads; increase in stress due to flattening; Otte basket head; patented elliptic head; insulation; new calculation of strength of head.

High-Pressure. High Pressure Vertical Boiler Plants (Steilrohr-Hochleistungskesselanlagen), H. F. Lichte. Wärme- u. Kälte-Technik, vol. 28, nos. 12, 13 and 14, June 16, 30 and July 14, 1926, pp. 133–136, 145–147 and 157–162, 22 figs. Details of Hanomag vertical boilers, types of 4 and 5 boiler shells, traveling grates, etc., for pressures of 25–35 atmos.; cleaning of bent tubes; location of superheater.

Locomotive. See LOCOMOTIVE BOILERS.

Radiation Losses. The Radiation Losses of a Large Boiler Unit, A. Page. Power Engr., vol. 21, nos. 248 and 249, Nov. and Dec. 1926, pp. 423–425 and 457–459, 4 figs. Definitions and review of radiation losses; consideration of basis for radiation losses; calculation. Dec.: Proposed new method of ascertaining this factor.

Scale Prevention. Boiler Protection and Maintenance. Mar. Engr. & Motorship Bldr., vol. 49, no. 592, Dec. 1926, pp. 466–467, 1 fig. Particulars of filtrator, a simple device which prevents formation of boiler scale.

Specifications. New German Specifications for (Land-Type) Boiler Materials and Construction (Die neuen deutschen Werkstoff- und Bauvorschriften für Landdampfkessel), J. Bracht. Zeit. des Vereines deutscher Ingenieure, vol. 70, no. 50, Dec. 11, 1926, pp. 1675–1680. Reasons for developing new regulations; specifications for welding steel, ingot steel, steel castings and other materials; specifications for construction of stationary boilers.

BRAKES

Air. Study of Air Brake Tests at Purdue. Ry. Mech. Engr., vol. 100, no. 12, Dec. 1926, pp. 732–734, 1 fig. Investigation is being conducted by Am. Ry. Assn. for purpose of obtaining more economical operation of trains and of promoting safety for public and railroad employees; specifically, investigation is to determine which brake is most efficient, economical and safest for stopping freight trains.

BRASS

Castings. Some Defects in Brass and Bronze Castings. Foundry Trade Jl., vol. 34, no. 535, Nov. 18, 1926, p. 434. Describes defects due to process of

manufacture consisting chiefly of presence of impurities, whereas defects arising from after treatment are overheating, overworking welds, etc.; in searching for impurities, direct examination of polished section under microscope may reveal hidden trouble; etching can also be resorted to afterwards if required; oxide inclusions; defects which are caused during solidification.

BRASS FOUNDRIES

Cost Reduction. Cutting Costs in Non-Ferrous Plant, B. Finney. Iron Age, vol. 118, no. 22, Nov. 25, 1926, pp. 1471–1476, 15 figs. Compact arrangement of departments so that transportation of material is reduced to minimum, and provision for mechanical handling of metals and molds in its brass foundry, are features of new plant of More-Jones Brass & Metal Co., St. Louis, manufacturer of brass and bronze castings, etc.

BRONZES

Physical Properties. The Porosity and Physical Properties of Bronze (Ueber die Porosität und die physikalischen Eigenschaften des Rotgusses), Reitmeister. Giesserei-Zeitung, vol. 23, nos. 20 and 21, Oct. 15 and Nov. 1, 1926, pp. 559–564 and 592–596, 18 figs. Work at experimental foundry of German State Railway; processes of solidification in bronze alloys; testing of molding sand; relation between chemical composition and tendency to segregation; physical properties of bronze and results of tests conducted.

Stamping and Forging. Changes in Properties of Bronze with Stamping and Forging (Ueber Aenderungen der Eigenschaften von Zinnbronze beim Pressen und Schmieden), A. Schleicher. Zeit. für Metallkunde, vol. 18, no. 10, Oct. 1926, pp. 322–323, 6 figs. Investigation of a group of bronzes, formerly known as cannon bronze, showed that different kinds of working (stamping and forging) do not effect mechanical and technical properties of metal, but have considerable influence on structure.

Structure and Properties. The Structure and Properties of Bronze (Einiges über den Aufbau und die Eigenschaften von Rotguss), R. Kühnel. Zeit. für Metallkunde, vol. 18, nos. 9 and 10, Sept. and Oct. 1926, pp. 273–278 and 306–311, 24 figs. Effect of impurities, especially bismuth, arsenic, antimony and lead on a standard bronze used in railway practice for armatures, bearings, etc., of 85 per cent copper, 9 per cent tin and 6 per cent zinc content; auto-deoxidation; occurrence of stannic acid; effect of sulphur and its occurrence in structure; compressive strength, hardness, tenacity, workability and structure of series of melts which were produced in order to find a standard alloy as substitute for above-named bronze which is too expensive.

The Structure of Bronze (Der Aufbau des Rotgusses), M. Hansen. Zeit. für Metallkunde, vol. 18, no. 11, Nov. 1926, pp. 347–349, 5 figs. Brief review of present knowledge of structure of copper-tin-zinc alloys, based on existing literature; study of structure, based on diagrams.

C

CAMS

Kinematics of. Kinematics of Cams, Calculated by Graphical Methods, H. Schreck. Am. Soc. Mech. Engrs.—Advance Paper, for mtg. Dec. 6–9, 1926, 63 pp., 36 figs. Application of graphical methods for calculation of velocity and acceleration of cams; application of theory to problems comprising various shapes of cams and changes in kinematic conditions due to variation in shape; results are shown in tables and plotted in graphs.

CAR DUMPERS

Electric. Operating Economy of New Car Dumper Reflects Simplicity of Control, A. F. Case. Iron Trade Rev., vol. 79, no. 22, Nov. 25, 1926, pp. 1362–1363, 2 figs. 120-ton Toledo car dumper built by Wellman-Seaver-Morgan Co., for New York Central Railway Co., at Toledo docks; designed to handle all sizes of open-type railway cars.

CARS

Locomotive-Testing. The Locomotive Test Car of the German Railway Co. (Die Lokomotiv-Messwagen der Deutschen Reichsbahn-Gesellschaft), H. Nordmann. Organ für die Fortschritte des Eisenbahnwesens, vol. 81, no. 20, Oct. 30, 1926, pp. 397–408, 9 figs. Describes car and equipment; measuring tractive force, work at drawbar; speed, time and path recorders; measuring performance, consumption of fuel and steam, temperature, pressure, etc.; flue-gas analysis.

CARS, COAL

Hopper. New Hopper Cars for the C. & E. I. Ry. Rev., vol. 79, no. 19, Nov. 6, 1926, pp. 677–678, 3 figs. Design is based on coal-service requirements and cost of maintenance.

Rebuilding. Rebuilding Coal Cars at Yale Car Shops of the Frisco. Ry. Mech. Engr., vol. 100, no. 12, Dec. 1926, pp. 739–741, 7 figs. Average daily output of ten 40-ton gondolas is obtained with working force of 225 men.

CARS, FREIGHT

Ore. Chicago & North Western Buys Sturdy Ore Cars. Ry. Rev., vol. 79, no. 25, Dec. 18, 1926, pp. 885–887, 2 figs. New equipment is designed for severe service and has high ratio of revenue to light load; self-clearing hoppers arranged for center dumping into ore-dock pockets and with clear opening that does not permit use of continuous center sill.

CARS, PASSENGER

All-Metal. All-Metal Passenger Cars Built in France, A. Eisenschmidt. Ry. Mech. Engr., vol. 100, no. 12, Dec. 1926, pp. 741–742, 3 figs. Body is 64 ft. long with length over buffers of 66 ft.; object of designer was to construct body of car so as to have same stresses as would be set up in hollow beam under same load and reactions; trucks are pivoted on pressed-steel plates.

Aluminum. Light Metals for Car Construction (Leichtmetall im Wagenbau), M. Gentzcke. Verkehrstechnik, no. 45, Nov. 5, 1926, pp. 767–770, 11 figs. Discusses use of aluminum alloys in car or motor construction; suitable shapes of sheet metal; difference from steel-car design; behavior of aluminum alloys on impact; impact is only $^2/_3$ of that of steel cars.

CASE-HARDENING

Furnace. An Efficient Carburizing Furnace of the Surface Combustion Type, A. E. White and E. R. McPherson. Am. Soc. Steel Treat.—Trans., vol. 10, no. 6, Dec. 1926, pp. 941–950 and (discussion) 950–953, 5 figs. New furnace installation in Packard Motor Co., and results of tests run on these furnaces for purpose of determining temperature, distribution and regulation; production capacity; fuel-oil consumption; in author's opinion, ideal type of carburizing furnace is one of compensating type.

CAST IRON

Abrasion. The Abrasion of Cast Iron Due to Gliding Friction (Die Abnutzung des Gusseisens bei gleitender Reibung), O. H. Lehmann. Giesserei-Zeitung, vol. 23, nos. 21, 22 and 23, Nov. 1, 15 and Dec. 1, 1926, pp. 597–600, 623–627 and 654–656, 19 figs. Refers to former tests on abrasive resistance of cast iron; describes simple testing machine for this purpose; investigations made on brake-shoe material; behavior of gray cast iron toward steel, hard and soft castings; inadequacy of Brinell hardness test in determining abrasion of cast iron; importance of grain testing; abrasive resistance of gray cast iron with pure pearlitic structure; influence of phosphide eutectum. Bibliography.

Cooling and Contraction. Note on Cooling and Contraction of Iron Castings, I. Sugimura. Soc. Mech. Engrs. (Japan)—Jl., vol. 29, no. 114, Oct. 1926, pp. 585–594, 3 figs. Presents cooling and contraction curves of rapidly and slowly cast iron from melting to ordinary temperatures obtained by special apparatus of author's own design, and results are formulated in mathematical expressions; density and shrinkage of cast iron which occluded air while pouring. (In English.)

German Standards. Report of German Industrial Standards Committee (NDI-Mitteilungen). Bauingenieur, vol. 7, no. 45, Nov. 5, 1926, pp. 45–48 (Baunormung) 2 figs. Gives proposed standards for cast iron of various qualities; cast-iron steps (for concrete shafts).

Graphitization. Graphitization at Constant Temperature Below the Critical Point, H. A. Schwartz and H. H. Johnson. Am. Soc. Steel Treat.—Trans., vol. 10, no. 6, Dec. 1926, pp. 965–970, 1 fig. This paper is brief sequel to earlier paper by one of the authors; evidence is furnished that mechanism of reaction in its earlier stages at least, is identical above and below critical point; it is shown that apparent permanence of metastable system at atmospheric temperatures is not inconsistent with conception that graphitization proceeds at any temperature, no matter how low.

Influence of the Various Elements on the Graphitization in Cast Iron, H. Sawamura. College of Eng., Kyoto Imperial Univ.—Memoirs, vol. 4, no. 4, Sept. 1926, pp. 159–260, 141 figs. Influence of various elements on graphitization in white cast iron; influence of aluminum, nickel, copper, cobalt, gold and platinum, chromium, tungsten, molybdenum, vanadium, phosphorus, sulphur, manganese; theoretical consideration of graphitization; supplemental experiments; graphitization velocity and degree; mechanism of graphitization. (In English.)

Pearlitic. Perlit Iron, the Maurer Diagram, and other Formulae for Cast Iron. Metal Industry (Lond.), vol. 29, nos. 20 and 21, Nov. 12 and 19, 1926, pp. 467–468 and 491–492, 2 figs. Author challenges question of accuracy and reliability of iron-carbon-silicon diagrams of cast iron, and deprecates too great dependence upon their results; such dependence is not, he considers, justified in light of present knowledge and is apt to be misleading.

Testing Machine. Modern Cast-Iron Testing Machines (Neuzeitliche Gusseisen-Prüfmaschinen), H. Kalpers. Dinglers Polytechnisches Jl., vol. 107, no. 21, Nov. 1926, pp. 240–242, 9 figs. Details of apparatus by various makers for testing tensile strength, hardness, elasticity, limit of elasticity and reduction of profile area.

CASTING

Centrifugal. Progress in Centrifugal Casting (Neuerungen auf dem Gebiete des Schleudergusses), R. Fischer. Giesserei-Zeitung, vol. 23, no. 23, Dec. 1, 1926, pp. 643–653, 24 figs. General review of development; production of solid pieces; casting of rings, plates and wheels; casting of smaller hollow pieces; casting of pipes; the Briede patent; after-treatment of castings; quality of centrifugally cast pipe; efficiency of plants for centrifugal casting.

CENTRAL STATIONS

England. Electricity Supply at Derby. Elec. Rev., vol. 99, no. 2554, Nov. 5, 1926, pp. 744–747, 11 figs. Most recent additions to plant were inaugurated in Oct. 1926; adoption of pulverized coal; details of Lopulco pulverized-coal firing equipment; Babcock & Wilcox marine cross-type boilers, switchgear, etc.

Germany. Superpower House at Rummelsburg (Grosskraftwerk Rummelsburg), M. Rehmer. Elektrotechnische Zeit., vol. 47, no. 42, Oct. 21, 1926, pp. 1249–1257, 10 figs. Building program for steam superpower station within city limits of Berlin on Spree River comprises installation of three units of 100,000 kva. each, with sufficient room to double this capacity in near future; in boiler house two groups of eight boilers each are provided, which are fired with pulverized coal, and furnish steam at 35 atmos. at temperature of 425 deg. cent.; each of three turbine sets consists of quadruple unit; crew of 70 men per shift will be required to man station. See brief translated abstract in Elec. World, vol. 88, no. 24, Dec. 11, 1926, p. 1230.

London, England. Addition to Barking Station Part of London's Electrical Consolidation. Power, vol. 64, no. 23, Dec. 7, 1926, pp. 859–860, 2 figs. First half section of station comprises boiler house containing 12 boilers and 4 preheater units complete with chain-grate stokers, and turbine house containing 4 turbo-alternator sets, with condensing plant, etc.; 10 Babcock & Wilcox cross-drum marine boilers will be installed in two parallel lines, back to back; Lopulco central system of pulverized-coal firing is to be adopted; boiler plant under construction will complete first section of what promises to be one of largest generating stations in world.

CHAIN DRIVE

High-Speed. High-Speed Chain Drives, G. M. Bartlett. Machy. (N. Y.), vol. 33, no. 4, Dec. 1926, pp. 259–262, 2 figs. Effects of sprocket size, chain velocity and sprocket speed; important deduction to be drawn from research work described is that short-pitch chains of light weight and ample width are necessary for high-speed drives. Paper presented before Am. Gear Mfrs.' Assn.

CHAINS

Heat Treatment. Heat Treatment of Chains. Mech. World, vol. 80, no. 2079, Nov. 5, 1926, p. 363. Object is removal or partial removal of hardening and embrittlement produced by strains and shocks to which chains are subjected in practice; studies effect of low-temperature annealing (650 to 760 deg. cent.), and normalizing, upon mechanical properties of chains which have been subjected to varying degrees of plastic strain.

CHIMNEYS

Venturi. Layout of a Ventura Stack Connection, I. J. Haddon. Boiler Maker, vol. 26, no. 12, Dec. 1926, pp. 355–356, 1 fig. Construction consists of 2 frustums of cones having their sides at different angles.

COAL

Briquetting. Colloidal Briqueting (Die Kolloidbrikettierung), F. Weinmann. Glückauf, vol. 6, no. 35, Aug. 28, 1926, pp. 1137–1139. In colloidal process part of material to be briquetted is ground with water to form coarse colloidal dispersion; effect of colloidal particles is to bring about cohesion of coarser particles when whole mass is kneaded together and then subjected to moderate pressure; briquettes made by colloid process are immediately strong enough to be stored in bulk; they may be allowed to dry naturally or they may be passed through tunnel in presence of diluted flue gases; colloidal briquetting of brown coal can be practiced economically where output per day is as low as 50 tons; colloidal briquettes made from bituminous slack can be converted to smokeless fuel suitable for domestic use, valuable by-products being recovered during distillation. See brief translated abstract in Colliery Eng., vol. 3, no. 33, Nov. 1926, p. 508.

Carbonization. Coal-Distillation Processes (Steinkohlenschwelverfahren), A. Thau. Stahl u. Eisen, vol. 46, nos. 44 and 45, Nov. 4 and 11, 1926, pp. 1501–1508 and 1549–1558. Review of literature on existing processes; process with external heating with intermittent and with continuous operation; rotary ovens; process with heat transmission by means of metal baths; distillation process with scavenging gas; continuous process with stationary charge; types of retorts.

Low Temperature Carbonisation. Engineer, vol. 142, no. 3699, Dec. 3, 1926, pp. 604–605, 2 figs. Review of report on test made by Fuel Research Board on fusion rotary retort installed at works of Electro-Bleach and By-Products, Ltd., by Fusion Corp., Middlewich; retort is mild-steel lap-welded tube, rotating in horizontal position within heated brickwork chamber.

Low Temperature Carbonization and the Gas Industry, E. W. Smith. Gas World, vol. 85, no. 2207, Nov. 20, 1926, pp. 520–523. Disadvantages of raw coal; qualities required in solid smokeless fuel; gas industry and low-temperature methods; in author's opinion there is no satisfactory low-temperature process. See also Gas Jl., vol. 176, no. 3313, Nov. 17, 1926, pp. 433–436.

Engineering Progress. Progress in Fuels Engineering. Mech. Eng., vol. 48, no. 12, Dec. 1926, pp. 1416–1417. Progress report contributed by Fuels Division of Am. Soc. Mech. Engrs., shows that in combustion of coal for production of power, further large gains in efficiency are not anticipated except through use of extreme high pressures; coal problem of United States is one of utilization in so far as country at large is concerned.

Locomotive Clinkers, Extraction from. Recovery of Fuel from Locomotive Clinkers. Indus. Mgmt. (Lond.), vol. 13, no. 11, Nov. 1926, pp. 456–457, 2 figs. Coal-recovery plant installed by German State Railways within limits of loading gage, and mounted on standard-gage truck 13 m. long; portable plant has capacity of from 8 to 10 tons of raw clinkers per hour,

from which fuel is satisfactorily recovered at rate of two tons per hour. Translated from V.D.I. Zeit. See also description in Eng. Progress, vol. 7, no. 8, Aug. 1926, p. 212, 2 figs.

Spontaneous Combustion. The Oxidation of Pyrites as a Factor in the Spontaneous Combustion of Coal, S. H. Li and S. W. Parr. Indus. & Eng. Chem. vol. 18, no. 12, Dec. 1926, pp. 1299–1304, 9 figs. Recent studies on oxidation of coal seem to prove conclusively that oxidation proceeds very rapidly after temperature of 70 to 80 deg. cent. has been attained, and quickly reaches autogenous stage, while at normal temperatures oxidation is not ordinarily of sufficient magnitude to generate heat.

COAL HANDLING

Central Station. Coal Preparation and Handling at Trenton Channel, J. H. Drake. Power, vol. 64, nos. 18 and 19, Nov. 2 and 9, 1926, pp. 652–655 and 697–699, 10 figs. Nov. 2: Operating experience with coal-preparation and handling equipment from car unloader to burners. Nov. 9: Wear in mill exhauster fans, pneumatic-transport systems, feeders and burners, means and readiness of control and operating force.

Gas Works. New Fuel Handling Equipment at Atlantic City, C. W. Ross. Gas Age-Rec., vol. 58, no. 21, Nov. 20, 1926, pp. 725–726, 4 figs. Plant is designed to handle coke, anthracite or bituminous coal as generator fuel for three water-gas machines.

Plants. Coal-Handling Plant at the Gas Light and Coke Company's Beckton Works. Engineering, vol. 122, nos. 3174 and 3176, Nov. 12 and 26, 1926, pp. 589–591 and 650–653, 39 figs. partly on supp. plates. New scheme made provision for eight electric traveling cranes with maximum capacity each of 250 tons per hour, belt conveyor on each arm, with weighing machines, and discharging hoppers to barges in center, conveyor to river bank, and fourth one at right angles leading to new storage bunkers.

CONDENSERS, STEAM

Practice and Performance. Steam Condenser Practice and Performance, E. J. Chatel. Am. Soc. Mech. Engrs.—Advance Paper, for mtg. Dec. 6–9, 1926, 22 pp., 16 figs. Presents general idea of steam-condenser practice and performance in four plants of Detroit Edison Co.; condensers of single-pass type with range of from 0.95 to 1.05 sq. ft. of surface per kilowatt of turbine capacity should be considered good practice.

CONVEYORS

Bottles and Crockery. Handling Bottles and Crockery Mechanically, G. F. Zimmer. Indus. Mgmt. (Lond.), vol. 13, no. 11, Nov. 1926, pp. 451–453, 4 figs. Installation by W. & C. Pantin for handling bottles which is employed for conveying clean bottles in crates from washing and drying department on upper floor to milk-bottling machine on ground floor of dairy; another installation by same firm is one which handles soiled plates and dishes between washing departments and pantries in large restaurants and catering establishments.

Lubrication. Problems in Lubricating Conveyors, F. E. Gooding. Indus. Engr., vol. 84, no. 11, Nov. 1926, pp. 513–517, 10 figs. Deals with types of equipment commonly used in industrial service.

Mechanical Control. It's Almost Human, A. J. Howe. Factory, vol. 37, no. 6, Dec. 1926, pp. 998–1001, 1020 and 1024, 10 figs. Conveyor systems with mechanized control in footwear warehouse that minimizes cost of handling packages for storage and shipment.

Newspaper. Newspaper Conveyors, G. F. Zimmer. Indus. Mgmt. (Lond.), vol. 13, no. 12, Dec. 1926, pp. 487–490, 4 figs. An account of a new type of conveyor for the handling of newspapers from press to dispatch room.

Shaking. Prospect for Further Development of Electrically Driven Shaking Conveyors (Die Aussichten für die Weiterentwicklung der elektrisch betriebenen Schüttelrutsche), M. Wintermeyer. Bergbau, vol. 39, no. 37, Sept. 16, 1926, pp. 516–518, 3 figs. Electric drive with 3-phase motor of short-circuited rotor; special forms of electric drive by Albrecht and Knapp Machine Works.

Transport by Shaking Conveyors (Le transport en taille par couloirs oscillants), F. Quievreux. Société Industrielle de Mulhouse—Bul., vol. 42, no. 6, June-Aug. 1926, pp. 331–348, 8 figs. Describes Eickhoff types of conveyors used in Marie-Louise potash mine which are working satisfactorily.

COOLING TOWERS

Forced-Draft. Testing Forced-Draft Cooling Towers, F. W. Rabe. Power, vol. 64, no. 23, Dec. 7, 1926, pp. 865–866, 1 fig. Rapid and simple method of telling whether cooling tower operating under one set of conditions meets guarantee made for another set of conditions.

COPPER ALLOYS

Hot Forging. Effect of Hot Forging on Mechanical Properties of Alloys of Copper and of Aluminum (De l'influence du corroyage sur les propriétés mécaniques des alliages de cuivre et des alliages d'aluminium), M. Léon. Académie des Sciences—Comptes Rendus, vol. 183, no. 14, Oct. 4, 1926, pp. 541–544. Gives tables of impact and hardness tests before and after annealing of various types of brass, aluminum and alloys.

COST ACCOUNTING

Central Stations. Economic Statistics in the Form of Profit and Loss Calculation (Beitrag zur Frage einer Wirtschaftsstatistik in Form einer permanenten Erfolgsrechnung), E. Krause. Elektro—Jl., vol. 6, no. 19, Oct. 10, 1926, pp. 362–367. Discusses cost of production in electricity works, its calculation and range; ratio to kw-hr. produced and kw-hr. consumed; interest charges, balance sheets, etc.

CORE BOXES

Types. Various Types of Core Boxes (Différents types de boites à noyaux), E. Esmoil. Fonderie Moderne, vol. 20, Nov. 1926, pp. 283–288, 17 figs. Discusses principle of design; choice of box in accordance with number of cores per box; dimensions, etc.: classification of boxes with 15 examples.

CORES

Baking. Comparative Costs of Core Baking in Gas-Fired vs. Coke-Fired Ovens, H. T. Odenkirk. Gas Age-Rec., vol. 58, no. 25, Dec. 18, 1926, pp. 371–372. Cost per ton reduced; breakage less, working conditions bettered with gas fuel.

CORROSION

Ferroxyl Indicators. The Ferroxyl Indicator in Corrosion Research, U. R. Evans. Metal Industry (Lond.), vol. 29, nos. 21 and 22, Nov. 19 and 26, 1926, pp. 481–482 and 507–508, 9 figs. Discusses reliability of so-called ferroxyl indicator with special reference to McKay-Liebreich controversy regarding cause of pitting; mechanism of pitting.

Iron and Steel. Iron and Steel: Sulphuric and Nitric Corrosion, S. C. Bate. Chem. Age, vol. 15, no. 383, Oct. 30, 1926, pp. 419–420. Results of experiments in which action of oleum, sulphuric acid and nitric acid of various concentrations and mixtures of these acids on iron and steel were compared with object of discovering relative powers of resistance of iron and steel towards these acids, and any limiting nitric acid or water content in mixed acids at which any considerable corrosion of metal surfaces can be said to begin.

Shell Rivets and Plates. Corrosion, W. Bennett. Soc. Naval Architects & Mar. Engrs.—Advance Paper, no. 6, for mtg. Nov. 11–12, 1926, 28 pp., 37 figs. Recent examples of corrosion on shell rivet points; explanations advanced; corrosion theories; influence of copper content on steel; application of electrolytic theory; pitting and general corrosion.

CRANES

Portal. New Portal Cranes for the Kaiser Dock of the City of Dantzic, F. Woeste. Eng. Progress, vol. 7, no. 11, Nov. 1926, pp. 292–293, 2 figs. Portable portals each carry slewing crane; their rail gage is 9.45 m. and their clear height 5.2 m., enabling each of them to span two railway tracks; maximum load capacity is 5 tons; current is supplied to motors with aid of 3-core flexible armoured cables.

Slewing. Dynamics of Moving Loads During Acceleration Period (Die dynamischen Vorgänge während der Beschleunigungsperiode bewegter Massen bei Drehkranen), J. M. Bernhard. Fördertechnik u. Frachtverkehr, vol. 19, nos. 21, and 22, Oct. 15 and 29, 1926, pp. 320–323, and 335–337, 7 figs. Discusses theoretical basis of moments of acceleration and inertia; work of acceleration, kinetic energy; develops formulas for 200-ton hammer head crane; diagrams on magnitude of resistances in operation from no load to maximum load.

CUPOLAS

Coke Combustion. The Influence of Moisture on the Combustion, Especially of Coke (Ueber den Einfluss der Feuchtigkeit bei Verbrennungsvorgängen, insbesondere bei der Verbrennung von Koks), P. Oberhoffer and E. Piwowarsky. Stahl u. Eisen, vol. 46, no. 39, Sept. 30, 1926, pp. 1311–1320, 4 figs. Experiments on laboratory basis conducted by authors on cupola 1500 mm. high with inner diameter of 220 mm. in tuyere zone; results show that certain amount of moisture has favorable effect on combustion of coke; critical amount of moisture is that where advantage of improved radiation is compensated by heat consumption of endothermic reduction of steam; other experiments showed that moisture had bad effect on ignition temperature and combustibility of coke measured by reduction of CO_2. See also translated abstract in Foundry Trade Jl., vol. 34, no. 535, Nov. 18, 1926, p. 441.

Melting Process. The Interest of the Iron Founder in the Question of Direct Production of Iron (Das Interesse des Eisengiessers an der Frage der direkten Eisenerzeugung), C. Gilles. Giesserei-Zeitung, vol. 23, no. 21, Nov. 1, 1926, pp. 587–591, 7 figs. Compares Corsalli process of melting carbon-poor iron (especially iron and steel scrap) with standard practice; cupola operation according to Corsalli process; auxiliary melting apparatus; ferroalloys in cupola.

CUTTING TOOLS

Diamonds. Diamonds in the Machine Shop, C. O. Herb. Machy. (N. Y.), vol. 33, no. 4, Dec. 1926, pp. 241–245, 11 figs. Lathe and milling-machine operations in which high degree of accuracy and finish are obtained by using diamonds for cutters.

Holders. Methods of Holding Tools and Cutters, F. Horner. Machy. (N. Y.), vol. 33, no. 4, Dec. 1926, pp. 253–256, 5 figs. Tool-clamp requirements; cutters with clamping holes and slots; using special cross-section steel; welding and sweating tool bit to holders; simple holders employing binding screws; tool-locating device.

CYLINDERS

Lapping. Moline Automatic Cylinder Lapping Machine. Machy. (N. Y.), vol. 33, no. 4, Dec. 1926, pp. 305–306, 3 figs. Details of latest automobile-cylinder lapping machine developed by Moline Tool Co. with view to making operation as nearly automatic as possible.

Machining. Laying Out and Machining Large Pump Cylinders, W. Wheatley. Machy. (Lond.), vol. 29, no. 737, Nov. 25, 1926, pp. 246–247, 2 figs. Account of author's experience obtained while operating boring mill

D

DIESEL ENGINES

Airless-Injection. Tests on a Compressorless Diesel Engine of 500 Hp. Built by F. Krupp Corp., Essen, Germany (Versuche an einem kompressorlosen Dieselmotor von 500 PSe von Fried. Krupp, A.-G., Essen), F. Romberg. Zeit. des Vereines deutscher Ingenieure, vol. 70, no. 48, Nov. 27, 1926, pp. 1597–1604, 30 figs. Details of airless-injection Diesel of 214 r.p.m., built for Siemens-Bauunion in Ireland; it is 4-cylinder, single-acting 4-stroke-cycle type; results of tests and their evaluation; comparison with other engines with and without air injection.

Blowers for. Blowers for Marine Diesel Engines. Elecn., vol. 97, no. 2513, July 30, 1926, pp. 122–123, 5 figs. Electric motor and steam turbine-driven scavenging and supercharging sets; centrifugal versus reciprocating blowers.

De La Vergne. Non-Stop 457-Day Run Claimed for Kansas Diesel, J. H. Gallaway. Oil Engine Power, vol. 4, no. 12, Dec. 1926, pp. 751–752, 3 figs. Two-cylinder 130-hp. De La Vergne engine installed in municipal electric plant at Ashland, Kan., made remarkable non-stop run of 15 months.

Generator Drive. High Speed Diesel Engines for Driving Dynamos. Soc. Mech. Engrs. (Japan)—Jl., vol. 29, no. 114, Oct. 1926, pp. 595–617, 10 figs. Results of experiments on high-speed Diesel engine for driving dynamo at testing shop of Ikegai Iron Works, Ltd. (In Japanese.)

Maintenance. Hints on Diesel Engine Maintenance, J. M. Bloomfield. Power House, vol. 20, no. 22, Nov. 20, 1926, pp. 21–24. Author points out that many of parts which require care are common to all prime movers; cause of vibration; examination and cleaning of piston; condition of jackets; valves and fuel pump; inspection of governor.

Preheating Fuels for. Preheating Heavy Fuels for Diesel Engines. Oil Engine Power, vol. 4, no. 12, Dec. 1926, pp. 756–758, 3 figs. Tests demonstrate success in burning cheap heavy grades of oil.

600-B.Hp. 600-B.Hp. Four-Stroke Cycle Diesel Engine. Engineering, vol. 122, no. 3175, Nov. 19, 1926, pp. 626–628, 15 figs. partly on supp. plate. Six-cylinder engine with air injection, built by Belliss and Morcom.

DRILLING MACHINES

Automatic Tapping and. Boeger-Meyer Automatic Tapping and Drilling Machine. Am. Mach., vol. 65, no. 24, Dec. 9, 1926, p. 967, 2 figs. Machine developed for production work; feature of machine is feed conveyor of endless-chain type.

Boiler. Electrically-Operated Boiler Drill, O. Pollok. Eng. Progress, vol. 7, no. 11, Nov. 1926, pp. 303–304, 2 figs. Twin boiler-drilling machine for horizontal boilers supplied to Sulzer Bros., Switzerland, by Machinenfabrik Collet & Engelhardt, Germany; electrical equipment was supplied by German General Electric Co. (A.E.G.).

Multiple-Spindle. Fox Multiple-Spindle Drilling Machine. Machy. (N. Y.), vol. 33, no. 4, Dec. 1926, pp. 308–309, 2 figs. Feeding of drilling head on latest 33-HC heavy-duty multiple-spindle drilling machine, built by Fox Machine Co., is accomplished by means of oil-gear feed pump. See also Iron Age, vol. 118, no. 24, Dec. 9, 1926, p. 1628, 1 fig.

Radial. Locomotive Frame Radial Drilling Machine. Machy. (Lond.), vol. 29, no. 737, Nov. 25, 1926, p. 245, 2 figs. Details of Braun radial drilling machine; it is interesting in so far as it indicates trend of modern German design with regard to number and position of electric motors employed on single large machine and centralization of control gear.

Wickes No. 2 Heavy-Duty Wall Radial Drill. Am. Mach., vol. 65, no. 25, Dec. 16, 1926, p. 1005, 2 figs. Designed for use in boiler shops and structural-steel shops for drilling holes in boiler plate or structural steel; it can also be used for countersinking, enlarging punched holes, or for reaming holes.

DROP FORGINGS

Trimming. Dies and Presses for Trimming Forgings, E. V. Crane. Forging—Stamping—Heat Treating, vol. 12, no. 11, Nov. 1926, pp. 416–420, 8 figs. Discusses various types of dies and presses used for trimming drop forgings; data for selecting proper size press given.

E

ECONOMIZERS

Heat-Stage. Heat Stage Economizers, W. S. Findlay. Power Engr., vol. 21, no. 248, Nov. 1926, pp. 405–406, 4 figs. Method of constructing economizers with two or three stages in order to efficiently apply contra-flow principle.

EDUCATION, INDUSTRIAL

Baltimore Plan. The Baltimore Plan of Industrial Education, E. B. Luce. Am. Gas Jl., vol. 124, nos. 6 and 23, Feb. 6 and June 5, pp. 109–112 and 493–497; and vol. 125, nos. 2 and 28, July 10 and Dec. 11, 1926, pp. 25–29 and 673–675, 5 figs. As developed and applied by Consolidated Gas, Elec. Light & Power Co. of Baltimore; types of education and training. July 10: "Training in" new employee. Dec. 11: Prize papers as means for developing employees.

Costs. The Costs of Engineering Education.

Eng. Education—Jl., vol. 17, no. 3, Nov. 1926, pp. 300–314, 3 figs. Study to determine costs of engineering education as accurately as possible and express them in comparatively simple units, to determine sources from which engineering colleges derive their revenues, and purposes for which funds are expended, and relative amounts expended for different purposes.

ELECTRIC FURNACES

Annealing. Electric Annealing Found Best by User, C. P. Yoder. Elec. World, vol. 88, no. 23, Dec. 4, 1926, pp. 1167–1171, 6 figs. Experiences of manufacturer who substituted electric annealing for oil-fired furnace under comparable conditions.

Tests with Electric Annealing Furnaces (Versuche mit elektrischen Glühöfen), T. Stassinet. Stahl u. Eisen, vol. 46, no. 45, Nov. 11, 1926, pp. 1537–1547 and (discussion) 1547–1549, 18 figs. Results of tests show that proper dimensioning of firebrick-wall thickness and insulation will bring about considerable saving in energy and great increase in efficiency; furnace built on this principle was subjected to thorough investigation, and it was shown that new type of electric annealing furnace can compete with most modern types of fuel-heated furnaces.

Crucible-Heating. Simple Electric Furnace (Ueber einen selbst zu wickelnden, schnell auswechselbaren, elektrischen Tiegel-Widerstandsofen), A. Simon and G. Müller. Zeit. für angewandte Chemie, vol. 39, no. 45, Nov. 11, 1926, pp. 1377–1380, 6 figs. For heating crucibles, simple electric resistance heating unit has been designed, consisting of crucible, stand and jacket, all of special porcelain, which remains non-conducting up to 1300 deg. cent. or more; crucible is grooved and can be easily wound with new heating coil when required.

High-Frequency. High-Frequency Furnaces (Einiges über Hochfrequenzöfen), J. Bronn. Zeit. für Metallkunde, vol. 18, no. 11, Nov. 1926, pp. 333–338, 10 figs. Conversion of network frequency into high frequency; relation between heat absorption of materials to be heated by high-frequency current and their electric conductivity, periodicity, diametric conditions, etc.; melting efficiency with small and large furnace units; comparison of efficiency of high-frequency and induction furnaces; possibilities of development of high-frequency furnaces.

ELECTRIC LOCOMOTIVES

Classification and Analysis. Electric Locomotives, T. A. F. Stone. Engineering, vol. 122, no. 3176, Nov. 26, 1926, pp. 674–676, 2 figs. Method of classifying, analyzing and comparing their characteristics. (Abstract.) Paper read before Instn. Mech. Engrs.

ELECTRIC RAILWAYS

Interurban Cars. Indiana Service Corporation's New Cars Have Many de Luxe Features. Elec. Ry. Jl., vol. 68, no. 20, Nov. 13, 1926, pp. 874–879, 8 figs. Two parlor-chair buffet cars and five motor coaches with same general type of construction have ultra-comfortable seats; low-voltage lighting unaffected by varying line voltage; easy riding trucks and latest Pullman-car conveniences.

ELECTRIC WELDING

Butt Welding. Electric Fusion Welding Process (Das elektrische Abschmelzschweissverfahren), J. Sauer. Werkstattstechnik, vol. 20, no. 19, Oct. 1, 1926, pp. 579–585, 26 figs. Shows by means of examples on boiler tubes, crankshafts, camshafts, cutting tools, etc., that the butt-welding process has been improved to a point of giving absolutely safe welds; comparative data with fire welding, strength tests, etc.

ELECTRIC WELDING, ARC

Automatic Welders. General Electric Automatic Welder. Machy. (N. Y.), vol. 33, no. 4, Dec. 1926, p. 308, 1 fig. With new design of automatic arc welder, operator need only push button to start sequence of operations, weld being produced without any further effort or skill on his part. See also Iron Age, vol. 118, no. 23, Dec. 2, 1926, p. 1556, 2 figs.

Westinghouse Automatic Arc Welder. Machy. (N. Y.), vol. 33, no. 4, Dec. 1926, pp. 309–310, 2 figs. Machine that automatically feeds welding wire used in metallic electrode welding, to work at any speed up to 3 ft. per minute; known as Auto-Arc machine.

Characteristics and Application. Electric Welding, Characteristics and Uses (La soudure électrique), M. A. Ménétrier. Electricité & Mécanique, nos. 12 and 13, May-June and July-Aug. 1926, pp. 1–14 and 18–33, 26 figs. Concludes from experiments that for plates 2 to 30 mm. thick, arc welding is best; for thinner plates resistance welding is best; automatic arc welding as developed by G. E. C. and used in United States.

Hydrogen. Flames of Atomic Hydrogen, I. Langmuir. West. Soc. Engrs.—Jl., vol. 31, no. 10, Oct. 1926, pp. 373–387, 7 figs. Review of author's researches leading up to new development in welding.

Quasi-Arc. "Quasi-Arc" Electric Welding Used to Repair Princes Bridge, Melbourne. Indian Eng., vol. 80, no. 18, Oct. 30, 1926, p. 248, 3 figs. Particulars of repair work carried out using quasi-arc electrodes.

Rails. Renewing Battered Rail Ends by Arc Welding, M. Whine and A. V. Thompson. Gen. Elec. Rev., vol. 29, no. 12, Dec. 1926, pp. 880–881, 3 figs. Results of tests by So. Pac. R. R. Co. making use of 2 gas-engine-driven sets.

Structural Steel. Tests of Arc Welded Structural Steel, A. M. Candy. Eng. Jl., vol. 9, no. 12, Dec. 1926, pp. 518–522, 15 figs. Test specimens were all welded with various members located in same position and manner as would be required if they were actually part of building structure.

Torches. The Electric Torch, J. C. Lincoln. Am. Welding Soc.—Jl., vol. 5, no. 11, Nov. 1926, pp. 18–23, 2 figs. Apparatus developed in laboratory of Lincoln Electric Co.; experiments indicate that core of arc is blast from negative terminal, that current flows outside of blast, and that section of current across arc would be annulus and not a circle.

ELEVATORS

Controllers. Direct Current Elevator Controllers, C. A. Armstrong. Power, vol. 64, no. 23, Dec. 7, 1926, pp. 861–864, 3 figs. Operation of two-speed full-magnet type.

Gearless-Traction. The Emergency Stops of the Gearless Traction Elevator at the Terminal Landings, F. Hymans. Am. Soc. Mech. Engrs.—Advance Paper, for mtg. Dec. 6–9, 1926, 69 pp., 21 figs. Performance and limitation of emergency terminal stopping devices; calculation of required overhead clearances.

Practice. Electric Elevator Practice, E. M. Bouton. Elec. Jl., vol. 23, nos. 2, 3, 4, 5, 6, 8, 9 and 11, Feb., Mar., Apr., May, June, Aug., Sept. and Nov. 1926, pp. 52–57, 125–130, 156–161, 253–258, 322–325, 432–434, 470–475 and 572–579, 50 figs. Feb.: Classification; power requirements. Mar.: Slow and medium-speed elevators. Apr.: High-speed passenger elevators. May: Controllers for high-speed elevators. June: D.c. elevator motors. Aug.: Signals and dispatching systems. Sept.: Installation tests and maintenance of electrical apparatus. Nov.: Testing of elevator equipments.

EMPLOYEES, TRAINING OF

Railway. Delaware & Hudson Builds up Force by Training its Men. Ry. Eng. & Maintenance, vol. 22, no. 12, Dec. 1926, pp. 508–511, 3 figs. Student camps, organized instruction and systematic promotion develop high-grade supervisory officers.

EMPLOYMENT MANAGEMENT

Employers' Responsibility. The Employer; His Responsibilities, C. Piez. Engrs. & Eng., vol. 43, no. 10, Oct. 16, 1926, pp. 262–263. Points out that in final analysis, employer's responsibility consists of finding market in which he can dispose of labor of his workers; wages cannot be considered separately from production.

F

FIRE PREVENTION

Methods. The Prevention and Extinction of Fires. Chem. Age, vol. 15, no. 383, Oct. 30, 1926, pp. 418–419. Résumé of methods and materials used in prevention and extinction of fires in chemical industry.

FLAME PROPAGATION

Closed Cylinders. An Investigation of the Mechanism of Explosive Reactions. Univ. of Illinois Bul., vol. 23, no. 46, July 20, 1926, pp. 7–49, 19 figs. Study of flame propagation in closed cylindrical bomb and comparison of results of theoretical analysis of flame propagation with actual phenomena as observed by means of photographic records; study of explosion of mixtures of ethyl ether and air in cylindrical bomb of constant volume. Bibliography.

Flame Propagation in Closed Cylinders, G. R. McCormick. Sibley Jl. of Eng., vol. 40, no. 8, Nov. 1926, pp. 138–146 and 155–156, 16 figs. It has been noted by number of experimenters that in case of flame propagation in closed vessels there seems to occur a halt in velocity of flame propagation after wave front has traveled about two-thirds of length of vessel; phenomenon has been termed flame arrest; effects of variation in mixture ratio and of variations in dimension of bomb upon flame arrest.

FLOW OF AIR

Pressure Distribution. Influence of the Orifice on Measured Pressures, P. E. Hemke. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 250, Nov. 1926, 7 pp., 10 figs. Influence of different orifices on result of measuring same pressure distributions; circular cylinder is exposed to air stream perpendicular to its axis and its pressure distribution is repeatedly determined.

FLOW OF FLUIDS

Boundary-Layer Removal by Suction. Experiments with a Sphere from Which the Boundary Layer is Removed by Suction (Versuche an einer Kugel mit Grenzschichtabsaugung), O. Schrenk. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 17, no. 17, Sept. 14, 1926, pp. 366–372, 13 figs.; and translation in Nat. Advisory Committee for Aeronautics, no. 388, Nov. 1926, 24 pp., 13 figs. partly on supp. plate. Task of removing boundary layer by suction consists in producing, in place of ordinary flow with formation of vortices, another kind in which vortices are eliminated by drawing small quantities of fluid from certain points on surface into interior of body; results of experiments with a sphere, which were made with apparatus previously used by Ackeret.

FLOW OF WATER

Curved Pipes. Velocity at Tangent of Curves of 36-in. Pipe, T. F. Davey. Eng. News-Rec., vol. 97, no. 23, Dec. 2, 1926, p. 905, 2 figs. Presents curves which are results of test carried out on 36-in. reservoir discharge pipe under head of 80 ft., at point of tangency of two curves, one the reverse of other; purpose was to establish supposition that on bend coefficient remained unchanged at different discharge rates.

Measurement. Accuracy of the V-Notch-Weir Method of Measurement, D. R. Yarnall. Am. Soc. Mech. Engrs.—Advance Paper, for mtg. Dec. 6–9, 1926, 14 pp., 7 figs. Results of tests made on V-notch weir tank having capacity of 1,000,000 lb. of water per hour in which accuracy was guaranteed to be within 1/2 of 1 per cent; tests were carried out at University of Pennsylvania; results are plotted and compared with those obtained by J. Barr published in Engineering in 1910.

FLYING BOATS

Paris Show. First International Nautical Show (Le 1er Salon Nautique International), L. Poincaré. Génie Civil, vol. 89, no. 19, Nov. 6, 1926, pp. 393–398, 13 figs. Describes types of motor boats, flying boats, hydroplanes, etc., exhibited; also marine engines, Diesel and semi-Diesel, propellers and other equipment.

Richard-Penhoet. The Richard-Penhoet Giant Flying Boat. Aviation, vol. 21, no. 24, Dec. 13, 1926, p. 1006, 1 fig. New giant five-engine flying boat built in France.

Supermarine. The Supermarine "Southampton." Flight, vol. 18, nos. 46 and 47, Nov. 18 and 25, 1926, pp. 744–747 and 759–764, 23 figs. This machine is able definitely to fly and maneuver with one of its two Napier "Lion" engines stopped; designed as naval patrol and reconnoissance flying boat, possessing very long range, and capable of carrying out bombing operations.

FLYWHEELS

Machining. Machining Studebaker Flywheels. Machy. (N. Y.), vol. 33, no. 4, Dec. 1926, pp. 248–249, 7 figs. Four separate operations, two of them roughing and two finishing, are performed on Studebaker flywheels to machine them all over from rough.

FOREMEN

Science of Foremanship. The Science of Foremanship, B. H. Van Oot. Mech. Eng., vol. 48, no. 12, Dec. 1926, pp. 1404–1406. Rapid development of foremanship into science; primary essentials of good foremanship; science of foremanship inclusive of science of management, supervision, and teaching; foremanship science of leadership.

FORGING

Presses. A Novel Electrically Operated Forging Press, A. Friederici. Eng. Progress, vol. 7, no. 11, Nov. 1926, pp. 309–311, 4 figs. Details of press manufactured by Kalk Machine Works, and comparison of this type with forging hammers and presses hitherto used.

FORGINGS

Brass. Brass Forgings, O. J. Berger. Machy. (N. Y.), vol. 33, no. 4. Dec. 1926, pp. 299–300. Gives reasons for forgings replacing brass castings; finish and strength of forgings; comparison of machining costs; hot-pressed parts; dies for hot-pressed parts, drop and steam hammers and for trimming flash; importance of correct heating.

FOUNDATIONS

Power Plants. Foundation Construction, New York Edison Power Plant. Eng. News-Rec., vol. 97, no. 23, Dec. 2, 1926, pp. 889–904, 13 figs. Electrically operated equipment takes materials from boats and delivers concrete aerially while excavation and pile driving proceed without interruption.

FOUNDRIES

Efficiency in. Increasing Efficiency in Foundry Practice (Leistungssteigerung im Giessereibetriebe), W. Rieth. Stahl u. Eisen, vol. 46, no. 43, Oct. 28, 1926, pp. 1470–1473, 3 figs. Discusses means and methods of increasing efficiency in foundry, and reducing production costs; piece-work rate setting and overhead-cost calculation; practical examples.

Intensification of Work. Intensive Work in Foundry Practice (Intensivierung im Giessereibetriebe), W. Rieth. Giesserei, vol. 13, no. 44, Oct. 30, 1926, pp. 846–849, 6 figs. Nature and purpose of intensification of work; shortening of work periods; reducing overhead; cost accounting; practical examples.

Purchasing. Foundry Purchasing, E. N. Simons. Foundry Trade Jl., vol. 34, nos. 531 and 534, Oct. 21 and Nov. 11, 1926, pp. 348 and 415. Centralized buying department and its establishment.

FREIGHT HANDLING

Container System. Scientific Transportation, W. P. Kellett. Soc. Automotive Engrs.—Jl., vol. 19, no. 6, Dec. 1926, pp. 563–568, 2 figs. As means of reducing number of handlings of freight necessary by present methods, use of container system is receiving increased attention; among salient features that such a system should possess are simplicity, ability to load and unload with ease; capacity for transferring containers quickly and easily from car to truck chassis without use of special equipment, and sturdiness and strength to withstand shocks; describes such system.

FUEL ECONOMY

Canada. Fuel Problem in Canada, L. R. Thomson. Can. Ry. Club—Official Proc., vol. 25, no. 7, Oct. 1926, pp. 21–50, 8 figs. Deals with actual situation in Canada in regard to location of coal, center of gravity of consumption, size of markets in fixing selling price, magnitude of imports and consumption and other similar factors; certain aspects of Canadian mining in relation to mining elsewhere.

FUELS

Automotive. See AUTOMOTIVE FUELS.

Coal. See COAL; PULVERIZED COAL.

Oil. See OIL FUEL.

Pulverized Coal. See PULVERIZED COAL.

FURNACES, HEAT-TREATING

Rotary-Retort. Heat Treatment of Conveyor

Parts in Rotary Retort Furnaces, F. S. O'Neill. Fuels and Furnaces, vol. 4, no. 12, Dec. 1926, pp. 1451–1452 and 1468, 2 figs. Rotary-retort furnaces heated with by-product coke-oven gas used in annealing, hardening and carburizing of parts of various sizes.

FURNACES, HEATING

Gas-Fired. Town Gas Fired Plate and Bar Re-Heating Furnace. Gas Jl., vol. 176, no. 3311, Nov. 3, 1926, pp. 290, 2 figs. Believed to be largest furnace in England fired by means of city gas; advantages derived from utilization of city gas when properly applied.

Heat Transmission in. Heat Transmission In Ingot-Heating Furnaces (Neuere Erkenntnisse auf dem Gebiete des Wärmeübergangs in Stossöfen), H. Netz. Stahl u. Eisen, vol. 46, no. 46, Nov. 18, 1926, pp. 1592–1594, 2 figs. Results of investigations on a coal-fired furnace to determine heat-transmission coefficients for transfer of heat from gas to ingot; conditions influencing heat transmission.

G

GAS ENGINES

Cycles. Ideal Gas-Engine Cycles, R. C. Heck. Am. Soc. Mech. Engrs.—Advance Paper, for mtg. Dec. 6–9, 1926, 41 pp., 23 figs. Author's purpose is to promote use, with internal-combustion engine of ideal performance as standard of comparison, by making standard almost as readily convenient as is Mollier chart for steam engine; this purpose is accomplished in two steps: developing working chart that combines in one temperature-entropy diagram and diagram of internal energy and total heat on entropy, in which any horizontal line is line of constant temperature, constant energy and constant total heat; and showing by trial upon representative examples that this chart, based on properties of average gas mixture, gives essentially correct output for any working mixture within range of gas-engine practice.

GAS TURBINES

Exhaust-Gas. Exhaust-Gas Turbines (Abgasturbinen), A. E. Thiemann. Motorwagen, vol. 29, no. 28, Oct. 10, 1926, pp. 661–671, 26 figs. Two articles dealing with attempts and achievements of Rateau and Moss in this field; author discusses underlying theory and arrives at no very hopeful conclusion on possibilities of these turbo-blowers; describes device developed by Lorenzen, combining turbine and blower into one unit with air drawn through hollow buckets of former; this helps to keep it cool; gives details and running results. See brief translated abstract in Automotive Abstracts, vol. 4, no. 12, Dec. 20, 1926, p. 374.

GEAR CUTTING

Sectors. Radius Milling Fixture for Gear Sector, A. A. Dowd. Machy. (N. Y.), vol. 33, no. 4, Dec. 1926, p. 274, 2 figs. Fixture consists of base secured to milling-machine table, dovetail slide on which work is clamped and radius bar, outer end of which pivots on stud on bracket, which is secured to knee.

GEARS

Non-Metallic. Using Non-Metallic Gear Drives, F. E. Gooding. Indus. Engr., vol. 84, no. 12, Dec. 1926, pp. 549–553 and 574, 10 figs. Prevention of noise and reduction of gear wear by eliminating metal-to-metal contacts; use of rawhide pinions and chemically prepared, non-metallic gear materials which consist of layers of fabric impregnated with and incorporated in, under heat and pressure, body of bakelite phenol resinoid; another method of making fabric-base gear material is by use of impregnated cotton fiber.

Symbols. A.G.M.A. Symbols for Gearing. Machy. (N. Y.), vol. 33, no. 4, Dec. 1926, p. 263. Gives list of standard symbols for gearing nomenclature, suggested by Am. Gear Mfrs'. Assn.

Teeth in Action. Gear Teeth in Action, E. Buckingham. Am. Mach., vol. 65, nos. 17, 18, 20, 21, 22, 23, 24 and 25, Oct. 21, 28, Nov. 11, 18, 25, Dec. 2, 9 and 16, 1926, pp. 677–679, 709–712, 787–790, 821–824, 863–866, 901–907, 946 and 993–995, 29 figs. Oct. 21: Calculating speeds and loads in planetary gearing; potential work done by planet gears and pinions is many times actual work transmitted. Oct. 28: Velocity ratios, tooth loads and power losses in internal planetary gear trains. Nov. 11: Speed and load problems solved for various forms of spur and internal planetary gear trains; differential and variable-speed gear trains. Nov. 18: Beam strength of gear teeth and various modifying factors; Lewis formula; results of tests by Marx and Cutter; effect of errors on velocity factor. Nov. 25: Tentative formula based on recent tests accounts for combined effect of velocity, tooth errors, character of materials, tooth form, tooth loads and rotating masses. Dec. 2: Determination of equivalent static load; simplification of equation by means of tabular data; characteristics of non-metallic pinions. Dec. 9: Relation of load to wear; latest test results indicate that for long life maximum specific stress as given by Hertz equation should not exceed elastic limit. Dec. 16: Effect of fillet radius upon stress distribution; gear efficiency investigations by W. Lewis, F. Reuleaux and G. Lanza; conclusions on efficiency are summarized.

Teeth, Surface-Hardened. Surface-Hardened Gear Teeth. Engineer, vol. 142, no. 3701, Dec. 17, 1926, pp. 661–662, 4 figs. Describes new system of hardening known as Shorter process, developed by Patent Gear Hardening Co.; process consists of intensely heating each tooth locally with acetylene blowpipe and immediately cooling it again with copious supply of water; result is layer of hardened steel on wearing part of tooth, while interior is left in its tough normal condition. See also description in Mech. World, vol. 80, no. 2085, Dec. 17, 1926, p. 488, 1 fig.

Variable-Speed. Variable-Speed Gears (Stufengetriebe), Huth. Praktischer Maschinen-Konstrukteur, vol. 59, no. 35–36, Sept. 4, 1926, pp. 397–398. Critical discussion of advantages and disadvantages of variable-speed gear for machine-tool drive.

Worm. Worm-Wheel Contact, E. Buckingham. Am. Soc. Mech. Engrs.—Advance Paper, for mtg. Dec. 6–9, 1926, 28 pp., 20 figs. Shows how any worm-wheel contact condition can be determined by analysis and points out in particular probable influence of nature of contact lines between worm and worm wheel upon lubrication conditions, efficiency and load-carrying ability; analyses of three helicoids are made and their equations given; conjugate action of racks is discussed and equations given; contact lines of screw helicoids used as worms and those of involute helicoids used as worms.

GRINDING

External. External Cylindrical Grinding (Rectification cylindrique extérieure), M. Guénard. Arts et Métiers, vol. 79, nos. 69, 70 and 73, June, July and Oct. 1926, pp. 201–218, 262–271 and 361–375, 40 figs. Operating conditions of grinding wheels, arc of contact, depth of cut, performance and wear; longitudinal displacement of workpiece or of grinding wheel. July: Speed of grinding wheel and of workpiece; preparing workpiece for grinding. Oct.: Time study, internal grinding; wet and dry grinding; examples.

Methods. Grinding Piston Pins, Cylinder Borings and Bushings (Schmirgeln und Ziehschleifen von Kolbenbolzen, Zylinderbohrungen und Buschsen), F. Isermann. Maschinenbau, vol. 5, no. 20, Oct. 21, 1926, pp. 940–944, 8 figs. New methods for precision work, known as lapping and honing in United States, and their introduction into Germany.

GRINDING MACHINES

Steel Balls. Progress in Abrasive Invention. Abrasive Industry, vol. 7, no. 12, Dec. 1926, pp. 381–382, 6 figs. Details of device for accurate grinding of steel balls, devised by Basile Francois Mahe.

Surface. Surface-Grinding Machines with Magnetic Tables. Engineering, vol. 122, no. 3178, Dec. 10, 1926, p. 735, 3 figs. New type of machine manufactured by Naxos-Union A.G. of Frankfurt, Germany, which is provided with means for slightly tilting head carrying wheel, thus reducing surface of contact when particularly high finish is required.

H

HARDNESS

Brinell Test. Limits of Application of Brinell Hardness Test (Anwendbarkeitsgrenzen der Brinellschen Kugeldruckprobe), P. W. Döhmer. Motorwagen, vol. 29, no. 24, Aug. 31, 1926, pp. 556–557. In technical publications there have appeared figures indicating Brinell hardness up to 1000; such hardness, for instance, was indicated for nitration case-hardening process of Krupp; in case of hardness figures of this magnitude, Brinell ball itself deforms excessively; it is likely that no hardness figure exceeding 500 Brinell is reputable; this would correspond to tensile strength of 350,000 lb. per sq. in.; for greater hardness, scratch methods or Shore or Herbert devices should be used.

Firth Hardometer. The Firth Hardometer. Foundry Trade Jl., vol. 34, no. 536, Nov. 25, 1926, p. 459, 2 figs. Apparatus has advantage of eliminating effect of inertia when applying load, and thus rules out that very considerable source of error to which many machines of this type are prone; there has been incorporated for use with hardometer diamond indenters which can be used in this machine by merely changing ball for such indenter.

HEAT TRANSMISSION

Calculation. Method for Measuring the Heat-Transmission Coefficient in Solids of Plate Form (Verfahren zur Messung der Wärmeleitzahl fester Stoffe in Plattenform), M. Jakob. Zeit. für technische Physik, vol. 7, no. 10, 1926, pp. 475–481, 3 figs. Method applicable to plates of poor conductivity and for temperatures of 100 deg. or more; plates are placed between electric heating element and cooling element, coefficient being determined from temperature drop.

Concrete Walls. Heat Transmission and Calculation of Heat Stresses in Reinforced-Concrete Walls Periodically Heated and Cooled (Ueber die Wärmeleitung und die Berechnung von Wärmespannungen in Eisenbetonstützmauren, welche periodische erwärmst und abgekühlt werden), N. Yamaguti. Beton u. Eisen, vol. 25, no. 21, Nov. 5, 1926, pp. 385–390, 8 figs. Calculation of heat distribution in walls with parallel surfaces, one of which is periodically heated, the other connected with ground; also applicable to concrete roads.

High Temperatures. Fluid Heat Transmission for High Temperatures in Industrial Processes, J. A. Beavell. Chem. & Industry, vol. 45, no. 45, Nov. 5, 1926, pp. 367T–376T, 21 figs. Oil may be regarded as entirely satisfactory for heat transmission at high temperatures, and failure to apply it successfully has been largely due to want of proper understanding of numerous factors involved and lack of attention to detail; details of oil-circulation heating system which has been applied to very large number of industrial processes and proved entirely satisfactory and reliable.

HEATING AND VENTILATION

Telephone Building, New York City. Zone Heating and Ventilating Systems Used in New Telephone Building. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 32, no. 12, Dec. 1926, pp. 807–816, 9 figs. Because of nature of occupancy and demand for maximum of comfort for employees, system of heating and ventilation which might be termed sectional or zone type was designed; building is divided into three horizontal zones. consisting of lower zone, first to 10th stories, intermediate zone, 11th to 17th stories, and upper zone, 18th to 32nd stories; distribution to these zones is independently controlled from indicating remote-control panel located in pump room; generally speaking, building is heated by two-pipe vacuum system with steam-driven vacuum pumps.

HEATING, HOT-AIR

Apparatus for Large Spaces. Air Heating of Large Spaces by Means of Waste Gases (Grossraum-Luftheizung mittels Abgasausnutzung), O. Brandt. Dinglers Polytechnisches Jl., vol. 107, no. 20, Oct. 1926, pp. 225–227, 6 figs. Discusses use of waste gases from glass, porcelain, blast and other furnaces; describes pocket air heater in which centrifugal fan draws air and forces it in thin layers through pockets; examples of plants.

HEATING, STEAM

Central. Municipal Heating (Die Städteheizung), E. Praetorius. Wärme- u. Kälte-Technik, vol. 28, no. 23, Nov. 17, 1926, pp. 273–276. Discusses cost of live and exhaust-steam heating and comparative cost; drawbacks of exhaust steam; steam vs. hot-water heating; pipe-line differences; advantages of centralized heating plants.

Electrical Energy from. Electric Generators in Steam Heating Plants (Industrielle Stromerzeugung aus Vorwärme der Raumheizanlagen), R. Pohl. Elektrotechnische Zeit., vol. 47, no. 41, Oct. 14, 1926, pp. 1185–1188, 1 fig. In effort to raise efficiency of steam-heating plants, author suggests that all industrial plants should provide high-pressure boilers, use turbine generator as reducing valve and heat with exhaust steam; generator would operate in parallel with local electric supply system; shows by actual examples that such "reducer" turbo sets are efficient (up to 70 per cent), and produce electric energy at fraction of cost of central-station service. See brief translated abstract in Elec. World, vol. 88, no. 23, Dec. 4, 1926, p. 1179.

Factories. Planning and Operation of Factory Heating Installations (Anlage und Betrieb von Fabrikheizungen unter besonderer Berücksichtigung der Wirtschaftlichkeit), Frenckel. Wärme, vol. 49, nos. 42 and 43, Oct. 15 and 22, 1926, pp. 735–740 and 756–760, 18 figs. Deals with choice of system and arrangement of equipment for heating workshops, etc., with special reference to question of economy; alternative sources of heat and different heating media are considered, together with distribution of heating medium, arrangement of heating surfaces and return flow; describes typical installations; in general, maximum economy is obtained by joint operation of power and heating systems. See brief translated abstract in Power Engr., vol. 21, no. 249, Dec. 1926, p. 468.

Vapor. Present Practice in Vapor Heating. Heat. & Vent. Mag., vol. 23, no. 12, Dec. 1926, pp. 112–113, 6 figs. Describes Sarco system which can be installed in smaller types of buildings.

HOBBING MACHINES

Change Gears for. Change-Gears for Spiral Gear Hobbing, J. M. Christman. Machy. (N. Y.), vol. 33, no. 4, Dec. 1926, pp. 272–274. Table for rapid computation of change gears and example illustrating application; method outlined may be used in computing change gears that produce exceptionally accurate leads.

Helical Gears. Unusual Example of Helical Gear Hobbing. Machy. (N. Y.), vol. 33, no. 4, Dec. 1926, p. 301, 1 fig. Describes hobbing helical pinion of No. 5 Newark gear-hobbing machine having differential so that roughing and finishing cuts were taken readily, as gear trains were not disengaged when carriage was returned for finishing cut.

HYDRAULIC TURBINES

Charts. Charts Simplify Hydraulic Computation, R. L. Livingston. Power, vol. 64, no. 26, Dec. 28, 1926, pp. 986–989, 2 figs. Presents chart giving relation between speed, head, horsepower and specific speed; its practical application; use of these two charts permits solution of large number of turbine and centrifugal-pump problems which would otherwise prove difficult and tedious.

Draft Tubes. Draft Tubes for Turbines (Ueber Turbinensaugrohre), H. Baudisch. Dinglers Polytechnisches Jl., vol. 107, no. 15, Aug. 1926, pp. 165–167, 2 figs. Operation and calculation of draft tubes for turbines with dynamic and with static power transmission.

Eddy-Impulse. The Eddy Impulse Turbine (Die Wirbelstrahlturbine), A. Gratzl. Zeit. des Österr. Ingenieur- u. Architekten-Vereines, vol. 78, no. 43/44, Oct. 29, 1926, pp. 429–433, 7 figs. New impulse turbines with especially high absorption capacity and high specific r.p.m., developed at laboratory of Vienna Technical High School; this type was designed as compromise between impulse and Francis types.

Geared. Geared Turbines for German Hydro Stations. Elec. World, vol. 88, no. 24, Dec. 11, 1926, pp. 1225–1226, 2 figs. At new station at Hohenstein, Germany, turbines, instead of being directly coupled to electric generators, drive latter through spiral gearing at ratio of 12.5 to 1, alternators thus running at speed of 750 r.p.m. for turbines; plant comprises three Francis-type vertical-shaft turbines built by J. M. Voith Co.

HYDRAULICS

Progress in. Progress in Hydraulics. Mech. Eng.,

vol. 48, no. 12, Dec. 1926, pp. 1417–1419. Progress report contributed by Hydraulic Division of Am. Soc. Mech. Engrs. dealing with water control, penstocks, turbines, automatic plants, impulse wheels, governors and oil sets and valves.

HYDROELECTRIC DEVELOPMENTS

Quebec. Power Development at St. Narcisse, Que. Can. Engr., vol. 51, no. 22, Nov. 30, 1926, pp. 665–666, 3 figs. North Shore Power Co., subsidiary of Shawinigan Water & Power Co., build dam above Grand Chute and power house below Chute Platte on Batiscan River; two 11,200-hp. Morris turbines and 10,000-kva. Westinghouse generators installed.

St. Lawrence River. Report on St. Lawrence Power Project. Can. Engr., vol. 51, no. 22, Nov. 30, 1926, pp. 667–670. Canadian section of joint Engineering Board recommends two-stage development at Ogden Island and Long Sault, while American section advocates single-stage development at Barnhart Island; two-stage would give 2,619,000-hp. and one-stage 2,730,000 hp. See also Contract Record, vol. 40, no. 48, Dec. 1, 1926, pp. 1132–1135, 1 fig.; and Eng. News-Rec., vol. 97, no. 23, Dec. 2, 1926, pp. 906–911.

Switzerland. Electric Power Development in Switzerland. Commerce Reports, no. 51, Dec. 20, 1926, pp. 736–737. Present capacity of hydroelectric plants is 1,850,000 hp. and further development is under way.

HYDROELECTRIC PLANTS

Conowingo, Md. Conowingo, G. R. Strandberg. Tech. Eng. News, vol. 7, no. 5, Nov. 1926, pp. 218–219, 236, 244 and 246, 3 figs. Details of second largest single hydroelectric installation in United States; it will have initial capacity of 378,000 hp. and ultimate capacity of 600,000; dam will be of concrete of gravity type.

France. The Chancy-Pougny Hydroelectric Plant on the Rhone and 120,000-volt Transmission (L'usine hydro-électrique de Chancy-Pougny, sur le Rhône, et la transmission à 120,000 volts de la Société L'Energie Électrique Rhône et Jura), M. Barrère. Génie Civil, vol. 89, no. 17, Oct. 23, 1926, pp. 341–348, 15 figs. Plant and equipment of Rhône and Jura Electric Co.; Charmilles and Escher-Wyss turbines, 3-phase alternators, transformers and switch plant; 120,000-volt line from Chancy-Pougny to Jeanne-Rose; masts and overhead equipment, substations, etc.

Intakes. Water-Intake Designed for Wide Distribution of Flow, M. G. Salzman. Eng. News-Rec., vol. 97, no. 25, Dec. 16, 1926, pp. 998–1002, 6 figs. Johnson-Wahlman draft distributor draws from wide area without unduly affecting flow; typical installation in Canada.

New Zealand. Extensions to the Lake Coleridge Power Station, N. Z., W. B. Morton. Elec. Engr. of Australia & New Zealand, vol. 3, no. 7, Oct. 15, 1926, pp. 258–260, 4 figs. Headworks include two pressure tunnels, 1.3 miles long, which convey water from lake to two surge tanks; from thence water is conveyed to power house by six riveted steel penstocks about half mile long, normal net head being 472 ft.; two new turbines are of Vickers Ltd. manufacture; generators are of horizontal type.

Quebec. Developing 400,000 H.P. for World's Largest Paper Maker, R. C. Rowe. Power House, vol. 20, no. 21, Nov. 5, 1926, pp. 19–24, 9 figs. Power developments of Canadian International Paper Co., which is capable of furnishing initial output of 400,000 hp.

I

ICE PLANTS

Electric Drive. Electric Drive of Refrigerating Machines (Der elektrische Antrieb von Kältemaschinen), Ganssauge. Zeit. für die gesamte Kälte-Industrie, vol. 33, nos. 9 and 10, Sept. 9, and Oct. 9, 1926, pp. 136–140 and 149–155, 19 figs. Compares American and German drives; electric, steam and gasoline drives; synchronous and asynchronous drives, and combination of their advantages. Oct. 9: Further development of synchronized asynchronous machines; German preference for asynchronous machines.

Modernization. Modernization Reduces Costs in Baltimore Ice Plant, W. Viessman. Power, vol. 64, no. 26, Dec. 28, 1926, pp. 983–985, 6 figs. Changing to raw-water system, reconditioning of plant and substitution of purchased power for steam drive saves 65 cents per ton of ice; all pumps are motor-driven; duplicate feeder lines insure continuity of service.

Water Purification. The Raw Material of the Ice Plant—Water, A. S. Behrman. Refrig. Eng., vol. 13, no. 3, Sept. 1926, pp. 92–95. Common impurities in water; recent developments in water purification for raw-water ice; when to use alum treatment and equipment required.

INDUSTRIAL MANAGEMENT

Developments. Progress in Management Engineering. Mech. Eng., vol. 48, no. 12, Dec. 1926, pp. 1407–1400. Progress report on review of recent accomplishment prepared by Management Division of Am. Soc. Mech. Engrs.

Mass Production vs. Mass Production versus Scientific Management, F. J. Miller. Mfg. Industries, vol. 12, no. 6, Dec. 1926, pp. 427–428. Critical discussion of article by H. Ford contributing to forthcoming edition of Encyclopedia Britannica in which he refers to scientific management and compares it with his own factory system; author points out that principles of mass production are part of scientific management; gives British examples of mass production.

INSPECTION

Importance of. The Importance of Inspection on Modern Production, D. S. Cole. Indus. Mgmt. (N. Y.), vol. 72, no. 6, Dec. 1926, pp. 354–358. Real function of inspection; quality and cost; actual methods employed in inspection are determined largely by product, when manufacturing under specifications and by sense of responsibility without them; presents typical problem.

Method. Modern Developments in Inspection Methods, E. D. Hall. Mech. Eng., vol. 48, no. 12, Dec. 1926, pp. 1435–1443, 21 figs. Description of ingenious apparatus and unique methods by means of which inspection keeps pace with production at Hawthorne Plant of Western Electric Co.

INSULATING MATERIALS, HEAT

Specifications and Choice. Specification and Choice of Lagging Materials (Richtlinien für die Vergebung von Wärmeschutzanlagen), J. S. Cammerer. Wärme, vol. 49, no. 43, Oct. 22, 1926, pp. 751–755. After pointing out mistakes most frequently made in selection of materials and in conditions of delivery framed with view to controlling quality of consignments, author makes suggestions concerning information which should accompany tenders, and condition of delivery which should be imposed; information which should be embodied in delivery contract; author illustrates his recommendations by giving data from acceptance tests on insulation of two thermal storage vessels. See brief translated abstract in Power Engr., vol. 21, no. 249, Dec. 1926, pp. 469–470.

INSULATION, HEAT

Dwellings. Insulation of a Private House, L. Nusbaum. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 32, no. 12, Dec. 1926, pp. 793–798, 3 figs. In 1922 author built two-story and attic colonial house, and insulated all exterior walls and exposed ceilings with $1^1/_2$-in. thick corkboard; results obtained by use of cork-insulated house, including saving in fuel, greater comfort at lower temperatures, more uniform temperatures between floor and ceiling, freedom from drafts and greater comfort in summer.

INTERNAL-COMBUSTION ENGINES

Detonation. The Role of Metallic Colloids in the Suppression of Detonation, H. L. Olin, C. D. Read and A. W. Goos. Indus. & Eng. Chem., vol. 18, no. 12, Dec. 1926, pp. 1316–1318, 4 figs. Investigation involving comparison of knock-producing tendencies of three classes of liquid fuels: (1) gasolines in which was dissolved measured quantity of anti-knock and small quantity of raw rubber; (2) gasoline in which was suspended metal colloid equivalent to solution (1) stabilized with small percentage of raw rubber; (3) pure gasoline except for same concentrations of rubber as other two, added for control; motor used was Harley-Davidson twin-cylinder, motor-cycle engine.

High Compression Without Anti-Detonators. High Compression in Explosion Engines (La surcompression dans les moteurs à explosion), P. Dumanois. Technique Moderne, vol. 18, no. 22, Nov. 15, 1926, pp. 673–679, 5 figs. Detonation problems; anti-knock compounds, their composition and use; eliminating detonation without using anti-knock compounds by modifying shape of combustion chamber.

The Possibility of Obtaining High Compression without Anti-Detonators (Sur la possibilité de réaliser de hautes compression sans antidétonants), P. Dumanois. Académie des Sciences—Comptes Rendus, vol. 182, no. 23, June 7, 1926, pp. 1378–1379, 1 fig. Based on idea that real or effective reduction of speed of wave of explosion might reduce chance of preginition at high compression ratios, piston with its head stepped was constructed and tested; it was found possible to increase this ratio to 6.7 without detonation occurring, and then it was due to heated plug points.

Supercharging. Supercharging Explosion Engines (La suralimentation dans les moteurs à explosion), L. Picard. Nature (Paris), no. 2743, Oct. 30, 1926, pp. 285–288, 9 figs. Advantages and disadvantages of supercharging; horsepower developed with and without compressor; different types of compressors; kinematic principle of Cozette compressor, etc.

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; GAS ENGINES; GAS TURBINES; OIL ENGINES.]

IRON

Plastic Deformation. The Plastic Deformation of Iron. Metallurgist (Supp. to Engineer, vol. 142, no. 3698), Nov. 26, 1926, pp. 161–162. Discusses formation of slip bands under strain; results of research.

IRON ALLOYS

Chromium-Iron-Carbon. Nature of the Chromium-Iron-Carbon Diagram, M. A. Grossmann. Am. Inst. Min. & Met. Engrs.—Trans., no. 1612–C, Dec. 1926, 17 pp., 18 figs. Consideration of somewhat radical modifications in iron-carbon diagram which are result of presence of notable amounts of alloying elements.

Iron-Molybdenum. The Iron-Molybdenum System, W. P. Sykes. Am. Soc. Steel Treat.—Trans., vol. 10, no. 6, Dec. 1926, pp. 839–870 and (discussion) 870–871 and 1035, 46 figs. Describes carbon-free alloys of iron and molybdenum and includes equilibrium diagram of this system as determined from fusion temperatures, heat treatments and study of accompanying microstructures; temperature-solubility relations make possible development of secondary hardness by aging supersaturated solid solution at 1112 to 1292 deg. fahr.; this hardness is equal to that of high-speed steel and persists at temperatures considerably higher.

IRON CASTINGS

Cost Fixing. Fixing Costs for Gray Iron Castings, H. P. Parrock. Iron Age, vol. 118, nos. 25 and 27, Dec. 16 and 30, 1926, pp. 1681–1683 and 1815–1816, 2 figs. Dec. 16: Analysis of elements in jobbing foundry, for varying production; taking adequate profit into consideration. Dec. 30: Comparison of figuring methods of 5 foundries; derivation of estimating formula for pricing.

Design. Design of Castings (Gestaltung von Gussstücken), J. Dürscheidt. Maschinenbau, vol. 5, no. 22, Nov. 18, 1926, pp. 1027–1030, 13 figs. Shows by number of examples how to design castings so as to be economical; shaping of castings from metallurgical standpoint; castings not requiring finishing; avoidance of defects, etc.

Improvement. Results in Improving Quality of Iron Castings (Etude comparative des résultats obtenus dans l'amélioration des qualités des fontes moulées), L. Piedbeuf. Revuew Universelle des Mines, vol. 12, no. 1, Oct. 1, 1926, pp. 2–11, 5 figs. Compares various kinds of cast iron of high resistance by means of Maurer diagram; effect of rapid and slow cooling; graphitization; micrographic study.

Tinning. Some Notes on Tinning Iron Castings, A. Eyles. Mech. World, vol. 80, no. 2079, Nov. 5, 1926, p. 360. Dilute sulphuric-acid bath is sometimes used as pickling solution for iron castings; preparation of hydrofluoric-acid pickling solution; pure tin should be used if it is necessary to obtain bright luster.

IRON METALLURGY

Progress. The New Year's Progress in Ferrous Metallurgy. Mech. Eng., vol. 48, no. 12, Dec. 1926, pp. 1443–1448, 3 figs. Presents advances in metallurgy of ferrous materials that have taken place since summer of 1925; deals with martensite, delta iron, impact tests on nickel-chromium steels, macroscopic examination of iron and steel, etching reagents, ultra-violet metallurgy, X-Ray photography, chromizing, method of observing flaws in metal surfaces, dilatometric method of heat treatment, carbonization, Maurer carbon-silicon diagram of cast iron, malleable cast iron electric silicon steel, fatigue failure of metals, etc.

J

JIGS

Design. Points on Jig and Fixture Design, C. C. Hermann. Machy. (N. Y.), vol. 33, no. 4, Dec. 1926, pp. 250–252, 4 figs. Finish on jigs; planning sequence of operations; milling fixture; drill jig for second operation.

Drill. Drill-Jig Designs Embodying Standard Construction, F. W. Curtis. Am. Mach., vol. 65, no. 25, Dec. 16, 1926, pp. 989–992, 10 figs. Jigs developed by National Cash Register Co. for use in connection with machining parts requiring drilling.

L

LATHES

Turret. Machining Hoist Drums in Turret Lathes. Machy. (N. Y.), vol. 33, no. 4, Dec. 1926, pp. 279–280, 4 figs. Two turret lathe set-ups used in plant building excavating, concrete-conveying and other construction machinery.

Warner & Swasey Universal Turret Lathe. Machy. (N. Y.), vol. 33, no. 4, Dec. 1926, pp. 312–313, 3 figs. No. 4 lathe having bar capacity of $1^1/_2$ in. and maximum swing over ways is 16 in. See also Iron Age, vol. 118, no. 23, Dec. 2, 1926, pp. 1552–1553, 3 figs.

LOCOMOTIVE BOILERS

Belpaire Type. Pennsylvania 4-8-2 Locomotive Boiler Has New Features. Boiler Maker, vol. 26, no. 12, Dec. 1926, pp. 341–345, 13 figs. Expansion joint formed by corrugated plate between firebox and combustion chamber and in bottom of tube sheet.

LOCOMOTIVES

Electric. See ELECTRIC LOCOMOTIVES.

Evaporation Tests. Recent Results from Experiments with Steam Locomotives Carried Out by the Central Railway Office (Neuere Ergebnisse aus den Versuchen des Eisenbahn-Zentralamts mit Dampflokomotiven), H. Nordmann. Glasers Annalen, vol. 50, no. 10, Nov. 15, 1925, pp. 129–147, 5 figs. Experiments carried out to test general applicability of Strahl's equation and coefficients as to evaporation per sq. m. of heating surface, steam consumption, and variation in performance; results show considerable deviations from Strahl's values and variation of these values with types of locomotives.

Four-Cylinder. Southern Railway—Four-Cylinder Express Locomotive. Engineer, vol. 142, no. 3697, Nov. 19, 1926, pp. 558–560, 10 figs., partly on supp. plate. Presents drawings of new locomotive which was described in preceding issue of same journal.

4-8-2. New 4-8-2 Locomotives for Pennsylvania. Ry. Rev., vol. 79, no. 21, Nov. 20, 1926, pp. 763–768, 13 figs. Intended for heavy passenger and fast freight service; weight on drivers 266,500 lb., tractive force 64,550 lb. See also description in Ry. Age, vol. 81, no. 21, Nov. 20, 1926, pp. 989–992, 7 figs.

Mikado. Mikado Locomotives for the Canadian National. Ry. Rev., vol. 79, no. 20, Nov. 13, 1926, pp. 707–708, 2 figs. Built in Pt. St. Charles shops for freight service in Atlantic region; boiler is equipped with siphons and feedwater heaters.

Mountain-Type. Pennsylvania Buys 200 Type

Locomotives. Ry. Mech. Engr., vol. 100, no. 12, Dec. 1926, pp. 724–729, 15 figs. Features in design of boiler and frame; 72-in. drivers; tractive force, 64,550 lb.

Side-Tank. New 2-6-2 Side-Tank Locomotives for the Egyptian State Railways. Ry. Gaz., vol. 45, no. 24, Dec. 10, 1926, p. 703, 1 fig. Built by North British Locomotive Co., Ltd.; primarily designed for switching service.

Steam-Turbine. A New Ljungström Turbo-Condensing Locomotive. Ry. Gaz., vol. 45, no. 18, Oct. 29, 1926, pp. 516–517, 3 figs. Built for service on British railways and under test on London Midland & Scottish Railway; it consists of boiler-carrying vehicle and turbine-driven condenser vehicle, latter having three pairs of coupled and driving wheels.

The Turbine Locomotive of the Firm of J. A. Maffei. Zeit. des Vereines deutscher Ingenieure, vol. 70, no. 47, Nov. 20, 1926, pp. 1565–1572, 22 figs. partly on supp. plate. New express locomotive for boiler pressure of 22 atmos.; surface condensation with spray recooling on tender; auxiliary machining process of condensation; feedwater preheating.

Superpressure. Fairlie-Perkins Super-Pressure Locomotive. Engineer, vol. 142, no. 3698, Nov. 26, 1926, p. 580, 2 figs. Articulated locomotive in which boiler is situated mid-way between two groups of wheels.

2-8-4. 2-8-4 Locomotives for the Illinois Central. Ry. Age, vol. 81, no. 24, Dec. 11, 1926, pp. 1161–1162. Similar in design to A-1 tested on Boston & Albany; tractive force with booster, 81,400 lb.

Walschaerts Valve Gear. Dependable Method of Setting Walschaert Valve Gear, L. V. Mallory. Ry. Mech. Engr., vol. 100, no. 12, Dec. 1926, pp. 765–766, 5 figs. Simplified by predetermining and maintaining proper lengths of various rods.

LUBRICATION

Researches. Recent Researches on Friction and Lubrication, J. E. Southcombe. Automobile Engr., vol. 16, no. 223, Dec. 1926, pp. 507–510, 8 figs. Reviews present state of knowledge of friction and lubrication, and in particular, describes most recent work on boundary lubrication and its influence on engineering practice.

LUBRICATORS

Sight-Feed. Positive Sight-Feed Oiler of New Design. Oil Engine Power, vol. 4, no. 12, Dec. 1926, pp. 759–760, 2 figs. Visibility of discharged oil, independent removal of pump units, are features.

M

MACHINE SHOPS

Cost Estimating in. Comparative Calculation (Vergleichende Kalkulation), H. Ludwig. Maschinenbau, vol. 5, no. 22, Nov. 18, 1926, pp. 1023–1027, 1 fig. Discusses comparative figures for same kind of turning, milling and thread-cutting work at five different plants, and importance of uniform methods of calculation to avoid losses.

Practice, Progress in. Progress in Machine-Shop Practice. Mech. Eng., vol. 48, no. 12, Dec. 1926, pp. 1424–1425. Progress report contributed by Machine-Shop Practice Division of Am. Soc. Mech. Engrs.

MACHINE TOOLS

Alignment. Alignment in Machine Tool Practice, F. Horner. Engineering, vol. 122, nos. 3175 and 3176, Nov. 19 and 26, 1926, pp. 647–648 and 676–677, 20 figs. Points out that any inaccuracy in regard to alignment effects product in some way or other, and adds to difficulty of setting up and of operation; deals with question of main frame or bed as primary matter concerning alignment.

Diagrams. Standardizing Performance Cards for Machine Tools (Winke und Wege zur Rationalisierung und Normung der Maschinenkarten), A. Scheid. Maschinenbau, vol. 5, no. 21, Nov. 4, 1926, pp. 975–979, 12 figs. Discusses construction of charts with ordinary and logarithmic divisions, indicating feeds and speeds, time, etc., for rotating and reciprocating machines.

Elements Causing Troubles. Machine-Tool Parts Liable to Cause Stoppages (Kritik einiger oft zu Betriebsstörungen Anlass gebender Konstruktionselemente im Werkzeugmaschinenbau), M. Weil. Praktischer Maschinen-Konstrukteur, vol. 59, no. 45–46, Nov. 13, 1926, pp. 511–516, 9 figs. Worm-gear drives, friction couplings and springs (leaf, spiral, etc.) and their manipulation to avoid stoppages.

Light Castings for. Lighter Metal for Machine Tools, J. W. Bolton. Iron Age, vol. 118, no. 24, Dec. 9, 1926, pp. 1615–1618, 5 figs. Discusses what can be done to help quality of tool by raising physical standards of casting; advocates use of steel and alloy steel; suggests that use of fine-grained iron of nearly pearlitic matrix is ideal material for machine-tool construction.

Operation Indicators. A New Aid to the Production Engineer (Ein neues Hilfsgerät des Betriebswirtschaftlers), G. Peiseler. Werkstattstechnik, vol. 20, no. 22, Nov. 15, 1926, pp. 661–663, 8 figs. Describes automatic recorder, called Diagnostiker, showing by curves operation and stoppages of tools and movements of workpieces.

Selection. What Are the Steps Taken in Buying Equipment? Am. Mach., vol. 65, no. 24, Dec. 9, 1926, pp. 935–936. Answers to questionnaire giving views of various organizations.

MACHINERY

Foundations. Machine Foundations (Maschinenfundamente), E. Rausch. Bauingenieur, vol. 7, nos. 44 and 45, Oct. 29 and Nov. 5, 1926, pp. 859–863 and 877–882, 18 figs. Discusses mass of foundations, derivation of formulas for vibrations, vertical and horizontal; movements of foundations and their causes; turbine foundations; effect of steam pipe lines; calculation of forces in masses in rotation, reciprocation or impact motion; advantages of rigid foundations; admissible stresses in case of periodic loading.

MALLEABLE CASTINGS

Annealing. Annealing Malleable Castings in a Continuous Tunnel Furnace, W. N. Robinson. Fuels and Furnaces, vol. 4, no. 12, Dec. 1926, pp. 1473–1475 and 1478, 3 figs. Semi-muffle furnace of tunnel-kiln type heated by producer gas has productive capacity of 16 tons per 24-hour day on 120-hour annealing cycle.

Graphitization. On the Mealleable Cast Iron and the Mechanism of its Graphitisation, T. Kikuta. Foundry Trade Jl., vol. 34, nos. 534, 536 and 537, Nov. 11, 25 and Dec. 2, 1926, pp. 409–412, 464–466 and 477–479, 14 figs. Graphitization of white cast iron into malleable cast iron; effect of temperature on first and second stages of graphitization; effect of thickness of casting; effect of chemical composition on graphitization; effect of phosphorus; practical tests. Extracted from Science Reports of Tohoku Imperial Univ., Japan.

Heat Treatment. The Malleableizing Heat Treatment, H. A. Schwartz. Forging—Stamping—Heat Treating, vol. 12, no. 11, Nov. 1926, pp. 413–415. Author discusses metallurgical and manufacturing limitations under which heat treatment of malleable castings is carried out.

White-Heart vs. Black-Heart. A Comparison of Whiteheart and Blackheart Malleable Cast Irons, A. E. Peace. Foundry Trade Jl., vol. 34, no. 536, Nov. 25, 1926, pp. 460–462. Essential difference in two materials is due to pig iron used; melting and casting; annealing and straightening; structure and physical properties; magnetic properties; applications.

MALLEABLE IRON

Malleableizing Kiln. A Continuous Malleableizing Kiln, G. Blakney. Am. Gas Assn. Monthly, vol. 8, no. 12, Dec. 1926, pp. 755–756 and 759–760. Development of tunnel type of continuous oven, through which pots of castings are passed in regular sequence; outstanding feature is design of tunnel, which is open full length on both sides from bottom of kiln; another characteristic is semi-muffle feature.

MATERIALS HANDLING

Progress in. Progress in Materials Handling. Mech. Eng., vol. 48, no. 12, Dec. 1926, pp. 1409–1410. Progress report prepared by Materials Handling Division of Am. Soc. Mech. Engrs.

Superphosphates. Handling Superphosphates at the Nantes Works of the Bordelaise Chemical Co. (La manutention mécanique des superphosphate à l'usine de Nantes de la Compagnie Bordelaise des Produits Chimiques), J. Silvy-Leligois. Génie Civil, vol. 89, no. 14, Oct. 2, 1926, pp. 269–272, 5 figs. Design and construction of monorail overhead equipment for circuit of 800 m., 15 m. difference in levels and 120 to 130 tons capacity per hour, speed 1.30 mp.; for conveying and storage of manufactured superphosphate.

METAL DRAWING

Plastic Behavior of Metal. The Plastic Behavior of Metal in Drawing, C. L. Eksergian. Am. Soc. Mech. Engrs.—Advance Paper, for mtg. Dec. 6–9, 1926, 35 pp., 21 figs. Author seeks to foster development of analysis to drawing as aid to subsequent development; outlines manner of working metal with reference to its state and behavior in comparison with that found in drawing; survey of conditions observed in forming of stamping.

METALS

Hardening. The Hardening of Metals by Dispersed Constituents Precipitated from Solid Solutions, R. S. Archer. Am. Soc. Steel Treating—Trans., vol. 10, no. 5, Nov. 1926, pp. 718–747 and (discussion), 747–757, 9 figs. Metals may be effectively hardened by highly dispersed particles within grains; typical process of hardening by this means consists in solution heat treatment at relatively high temperature followed by rapid cooling into region of supersaturation, then by precipitation treatment or aging to permit formation of very fine precipitate; examples of this type of hardening and generalizations regarding theory of process.

Plastic Deformation. Plastic Deformation of Metals, J. T. Norton and B. E. Warren. Am. Inst. Min. & Met. Engrs.—Trans., no. 1610-E, Dec. 1926, 17 pp., 20 figs. Nature and results of plastic deformation produced in cold working of metals; plastic deformation in face-centered cubic metal takes place by slip; many processes involved in cold working of metal give rise to same effects as those which occur by simple processes of elongation and directional rolling.

Stresses in. Problems of Stress (Einige Probleme aus dem Grenzgebiete zwischen Mechanik, Technologie und Metallkunde), W. Tafel. Zeit. für Metallkunde, vol. 18, no. 10, Oct. 1926, pp. 301–305, 4 figs. Characteristics of stresses and their distribution; discontinuity and decrease in stress during period of flow; difference between flow and fracture; relations between flow limit and final contraction; velocity of flow.

MILLING MACHINES

Rapid-Production. Rapid Production Milling Methods Applied to Tractor Parts, F. B. Heitkamp. Automotive Industries, vol. 55, no. 23, Dec. 2, 1926, pp. 932–937, 24 figs. Installation of modern machines and special fixtures enables manufacturer to effect savings in labor, floor space and time; standard cutters and arbors used; operations are described.

MOLDING METHODS

Time Study. Time Study for the Molding of a Disk Coupling (Zeitstudie für das Formen einer Scheibenkupplung), H. Tillmann. Giesserei, vol. 13, no. 45, Nov. 6, 1926, pp. 859–862, 4 figs. Investigation of production of piece on a molding machine, illustrating time-study system in a foundry.

MOLDS

Function and Preparation. The Mould—Its Function and Preparation, J. E. Fletcher. Foundry Trade Jl., vol. 34, no. 533, Nov. 4, 1926, pp. 389–392, 1 fig., and discussion in no. 534, Nov. 11, 1926, pp. 413–415. Effect of hot molds; ingot manufacture; Harmet process of making steel ingots in thick iron water-cooled molds; ingots being kept in contact with mold by means of hydraulic ram; types of molds; sand mold and sand testing; standardization difficulties.

Scabs. Various Causes of Scabs. Foundry Trade Jl., vol. 34, no. 536, Nov. 25, 1926, pp. 453–454, 3 figs. Critical discussion of article by H. S. Newton, published Aug. 19 issue of same journal.

MOTOR-BUS TRANSPORTATION

Cities. The Motor Coach in City Transportation, W. A. Draper. Aera, vol. 16, no. 5, Dec. 1926, pp. 807–812, 2 figs. Experience of Cincinnati Street Railway Co. is that bus lines did not draw from street cars when they were extended into territory that actually needed additional service.

New Haven Railway. Theory and Method of the New Haven Railroad's Highway Operation, A. P. Russell. Soc. Automotive Engrs.—Jl., vol. 19, no. 6, Dec. 1926, pp. 575–577. Explains policy adopted by New Haven Railroad in operation of its motor-coach lines and results obtained.

MOTOR BUSES

Electric. Electric Buses for Large Cities (Der Elektro-Omnibus in der Grossstadt), P. Friedmann. Verkehrstechnik, no. 44, Oct. 29, 1926, pp. 745–750, 7 figs. Details of storage-battery bus for 65 passengers, with maximum safety in operation by low center of gravity; maximum economy by perfect use of space and covered upper deck; comparison with gasoline buses as to cost and upkeep.

MOTOR-TRUCK TRANSPORTATION

Truck Service. The Importance of Tire Service in Motorcoach and Truck Operation, J. M. Linforth. Soc. Automotive Engrs.—Jl., vol. 19, no. 6, Dec. 1926, pp. 569–574, 13 figs. Studies made with view to improving fleet operation; presents series of charts giving results of data collected, causes of various delays, general causes of tire change over 5-month period, causes of tire change attributable to various operations, flat tires, etc.

MOTOR TRUCKS

Berlin Show. At the Berlin Show. Motor Transport, vol. 43, no. 1130, Nov. 8, 1926, pp. 543–546, 12 figs. Outstanding features are 6-wheelers, 6-cylinder engines, semi-Diesel engines and low level.

Krupp. Automobile Construction by Krupp (Kraftwagenbau bei Krupp), C. Laabs. Kruppsche Monatshefte, no. 7, Oct. 1926, pp. 173–179, 14 figs. Details of 3 to 5-ton trucks with cardan drive; omnibuses; street-cleaning vehicles of various types.

MOTORCYCLES

British Show. The Motor Cycle Show. Automobile Engr., vol. 16, no. 222, Nov. 1926, pp. 436–443, 23 figs. Outstanding feature of exhibition was large number of new single-cylinder machines, mostly of sporting type.

Machining Methods. Good Tools Speed Motorcycles to Completion, F. W. Curtis. Am. Mach., vol. 65, no. 23, Dec. 2, 1926, pp. 895–900, 17 figs. Selection of unusual machining operations, using special equipment and efficient tooling in producing miscellaneous motorcycle parts in Harley-Davidson plant.

N

NICKEL STEEL

Physical Properties. Physical Properties of Nickel and Nickel-Chromium Steels. International Nickel Co.—Nickel Steel Data and Applications, no. 9, 16 pp., 14 figs. Presents physical properties of nickel and nickel-chromium steels by means of average curves and tables of maximum and minimum values in endeavor to provide reliable data which can be used as basis for engineering calculations.

NUTS

Strength of. The Strength of Nuts, C. C. Pounder. Mech. World, vol. 80, no. 2081, Nov. 19, 1926, p. 399, 2 figs. For ordinary commercial purposes, Whitworth standard nut is doubtless satisfactory; although wasteful in material, but for light work, such as machinery of torpedo-boat destroyers or automobiles, it is quite common practice to use nuts of next smaller size, suitably drilled out; gives approximate calculations which will serve as guide to proportions which shall produce nut of strength equal to bolt.

O

OFFICE MANAGEMENT

Waste Elimination in. Eliminating Waste in Office Supplies and Machinery, J. Mitchell. Soc. of Indus. Engrs. Bul., vol. 8, no. 10, Oct. 1926, pp. 21–27 and (discussion) 27–28. Design and printing of forms;

central control of printed forms; form and service letters; reclamation of paper and binders and office appliances.

OIL ENGINES

Beardmore-Tosi. A Beardmore-Tosi Double-Acting Oil Engine. Mar. Engr. & Motorship Bldr., vol. 49, no. 592, Dec. 1926, pp. 464–465, 1 fig. Engine of small power per cylinder, operating on 4-stroke cycle with Tosi director-valve mechanism; simple lower cylinder cover.

Developments. Progress in Oil- and Gas-Power Engineering. Mech. Eng., vol. 48, no. 12, Dec. 1926, pp. 1421–1424. Progress report contributed by Oil and Gas Power Division of Am. Soc. Mech. Engrs., dealing with stationary engines, oil locomotives, and large gas engines.

Double-Acting. Double-Acting Oil Engines, W. S. Burn. Inst. Mar. Engrs.—Trans., vol. 38, Nov. 1926, pp. 281–301 and (discussion) 301–325, 10 figs. Liner wear is admittedly one of the most serious problems of present day Diesel engineer, and this problem can be simply reduced to one of lubrication; common and effective expedient to procure longevity of cylinder parts is to reduce mean effective pressure; 2-stroke cycle adapts itself more readily to double-acting principle than 4-stroke cycle; chief difference between single and double-acting types lies in fact that double-acting cylinder is more "boxed in" and internal conditions can only be gaged by external symptoms; details of Richardsons-Westgarth oil engine; effect of double action in main working parts.

Two-Stroke Double-Acting Marine Oil Engine. Engineer, vol. 142, no. 3697, Nov. 19, 1926, pp. 550–551, 7 figs. Details of single-cylinder unit, built by F. Krupp Germaniawerft with view to testing large-size cylinder of latest design.

High-Speed. A New High-Speed Oil Engine. Engineer, vol. 142, no. 3699, Dec. 3, 1926, pp. 614–616, 6 figs. Account of new type of engine capable of using wide range of fuels and of developing large power for its size and weight, built by A. G. Mumford under Mumford and Boothroyd patents; it is of medium-compression airless-injection type, fuel being mechanically injected into cylinder by timed valve at practically constant pressure.

Installation. Thoughts on the Installation of Oil Engines. Power, vol. 64, no. 25, Dec. 21, 1926, pp. 950–951, 2 figs. Practical suggestions as to points frequently ignored when oil engine is installed; avoid scanty foundations, low headroom, long exhaust lines and makeshift oil storage.

Solid-Injection. The Effect of Reduced Intake-Air Pressure and of Hydrogen on the Performance of a Solid Injection Oil Engine, G. F. Mucklow. Automobile Engr., vol. 16, no. 222, Nov. 1926, pp. 463–471, 11 figs. Experiments carried out in engineering laboratories of University of Manchester on Crossley engine in which small quantities of hydrogen or coal gas were introduced along with air supply to engine.

Trials. Marine Oil-Engine Trials. Engineering, vol. 122, nos. 3179 and 3180, Dec. 17 and 24, 1926, pp. 767–769 and 799–802, 9 figs. Summary of fifth report of Marine Oil-Engine Trials Committee dealing with trials of twin-screw motor vessel Cape York. See also Engineer, vol. 142, no. 3701, Dec. 17, 1926, pp. 657–659.

OIL FUEL

Evaporation. Investigation of Physical Properties of Liquid Fuels (Experimentelle Untersuchung der physikalischen Eigenschafter mittlerer und schwerer Brennstoffe, etc.), F. Heinlein. Motorwagen, vol. 29, no. 26, Sept. 20, 1926, pp. 617–624, 3 figs. Mathematical discussion of evaporation process, giving tables of constants.

OXYACETYLENE WELDING

Automobile-Engine Cylinders. The Welding of Cast Iron Internal Combustion Engine Cylinders, H. A. Horn. Am. Soc. Naval Engrs.—Jl., vol. 38, no. 4, Nov. 1926, pp. 904–911, 6 figs. Deals with welding of automobile-engine cylinders; enumerates principal casualties to cylinders and methods of repairing them by oxyacetylene welding. Translated from German.

Bronze Welding Foundry Flasks. Bronze-Welding Foundry Flasks. Oxy-Acetylene Tips, vol. 5, no. 5, Dec. 1926, pp. 84–86, 5 figs. Leading foundry saves $60,000 annually by this method of reclamation.

City Gas, Use of. Welding and Cutting with City Gas, J. Geartner. Am. Gas Jl., vol. 125, no. 24, Nov. 13, 1926, pp. 587–588, 1 fig. Describes welding and cutting torches, developed by Alexander Milburn Co., Baltimore, Md., for cutting steel of varying thickness from $^1/_8$ to 24 in. and for welding cast iron up to and including $^1/_2$-in. thickness.

Developments. Oxy-Acetylene Welding and Cutting, C. S. Milne. Machy. Market, nos. 1333, 1334, 1335, 1336 and 1339, May 21, 28, June 4, 11 and July 2, 1926, pp. 25–26, 21–22, 23–24, 21–22 and 23–24, 27 figs. Review of present position. Paper read before Brit. Acetylene & Welding Assn.

Single-Vee Welds. Ultimate Strength of Single Vee Welds, E. E. Thum. Am. Welding Soc.—Jl., vol. 5, no. 11, Nov. 1926, pp. 23–26, 2 figs. Results of tests made by Union Carbide and Carbon Research Laboratories, showing measure of reliability of oxyacetylene welding when done by men selected with reasonable care, and working under principles of procedure control.

P

PACKING

Automatic Appliances. How Automatic Appliances Reduce Production Costs, A. Jacob. Indus. Mgmt. (Lond.), vol. 13, no. 12, Dec. 1926, pp. 507–508, 1 fig. Mechanical aspect of this subject; today there are but few products of British factory which cannot be packed and handled by automatic means and, as writer points out, appliances are now available which are within reach of even smallest manufacturer, and which not only expedite output but which result in a very considerable reduction of manufacturing.

PAINTING

Spray Method. Principles of the Mechanical Paint-Spraying Method [Die Grundlagen des mechanischen Anstrich-(Farbspritz-) Verfahrens], P. Nettmann. Motorwagen, vol. 29, no. 30, Oct. 31, 1926, pp. 755–763, 13 figs. Details of process are explained.

PAINTS

White. Cause and Prevention of Staining on White Paints, H. T. Morgan and J. H. Calbeck. Indus. & Eng. Chem., vol. 18, no. 12, Dec. 1926, pp. 1227–1228, 3 figs. Comparative staining of various paints; determination of staining component; prevention of staining.

PATTERNS

Classification. Organization of Pattern Shops (Modellager-Organisation), H. Reininger. Giesserei, vol. 13, no. 43, Oct. 22, 1926, pp. 820–823, 5 figs. Discusses different possible ways of classifying patterns, with special reference to one system which has worked out exceedingly well in practice.

PIPING

Designation. Pipe-Line Designations, A. R. Nottingham. Power, vol. 64, no. 23, Dec. 7, 1926, p. 856. Objections to color scheme; describes system used by Archilles Power Co., Iota, Mich., which has unlimited possibilities.

POWER

Power Show, New York City. Power Show 1926. Power, vol. 64, no. 22, Nov. 30, 1926, pp. 825–836, 4 figs. Catalogue of exhibits on fifth annual power show arranged according to floors and booth numbers.

Fifth Power Show a Signal Success. Power, vol. 64, no. 24, Dec. 14, 1926, pp. 915–920, 7 figs. Review of exhibits; quality and diversity are outstanding features.

POWER GENERATION

Ocean's Heat. Power from the Ocean's Heat. Power, vol. 64, no. 22, Nov. 30, 1926, p. 805. Review of lecture by G. Claude before French Academy of Science, demonstrating process evolved by him of generating power from warm water of tropical regions.

PRESSES

Mechanical Feeds. Mechanical Feeds for Power Presses, E. V. Crane. Machy. (N. Y.), vol. 33, nos. 3 and 4, Nov. and Dec. 1926, pp. 161–165 and 266–271, 24 figs. Nov.: Their advantages, relation to design of press, and methods of driving. Dec.: Various classes of feeding mechanisms and conditions governing their application.

PRESSURE VESSELS

Stresses. Stresses Occurring in the Walls of an Elliptical Tank Subjected to Low Internal Pressures, W. M. Frame. Am. Soc. Mech. Engrs.—Advance Paper, for mtg. Dec. 6–9, 1926, 15 pp., 9 figs. Results of tests made on elliptical tank; presents analysis based on experimental data, from which stresses set up in walls may be calculated.

PRESSWORK

Rods and Tubes. The Pressing of Metal Rods and Tubes (Ueber das Pressen von Metallstangen und -Röhren), A. Schwarze. Wärme, vol. 49, no. 41, Oct. 8, 1926, pp. 727–729, 5 figs. Hydraulic presses for producing raw material for rods for metal-working plants with quantity production; difficulties encountered in pressing of rods, and means of eliminating them; new types of hydraulic presses for rods and tubes; features of design for reducing power consumption of presses.

PRINTING MACHINERY

Type-Setting Machines. Type-Setting Machines (Die Setzmaschinen), O. Wolters. Zeit. des Vereines deutscher Ingenieure, vol. 70, nos. 38, 39, 45 and 47, Sept. 18, Oct. 9, Nov. 6 and 20, 1926, pp. 1241–1247, 1344–1348, 1489–1493 and 1578–1581, 75 figs. Review of developments; linotype machines; direct and indirect type setting; details of processes and design of machines in common use.

PULVERIZED COAL

Fine Pulverization. Making Coal Flow Like Water, W. E. Trent. Iron Age, vol. 118, no. 24, Dec. 9, 1926, p. 1619. Experiments conducted by author showing that coal, when pulverized to pass very fine mesh, can be made to flow and seek its own level. (Abstract.) Paper read before Int. Coal Conference at Pittsburgh.

Industrial Plants. Pulverized Coal as Applied to Industrial Plants, W. E. Penfield. La. Eng. Soc.—Proc., vol. 12, no. 5, Oct. 1926, pp. 157–164 and (discussion) 164–177. Results of investigation of fuels and equipment made by E. Z. Opener Bag Co.; storage and unit systems of pulverized-coal utilization.

Lignite. Characteristics of Pulverized Lignite Firing (Eigenart der Braunkohlenstaubfeuerung), P. Rosin. Archiv für Wärmewirtschaft, vol. 7, nos. 9 and 11, Sept. and Nov. 1926, pp. 241–246 and 313–318, 20 figs. Compare methods of drying; fineness of powder depending on gas content; storage and conveying; adiabatic furnaces and most favorable temperature of equilibrium in combustion; air preheating depending on size of boiler; new pulverized-coal boilers of Böhlen Central Station; etc.

Unit System. Pulverized Coal, with Particular Reference to the Unit System, R. Jackson. Iron & Coal Trades Rev., vol. 113, no. 3063, Nov. 12, 1926, pp. 722–723. Storage vs. unit system; advantages of pulverized-coal firing. (Abstract.) Paper read before Instn. Fuel Economy Engrs.

PUMPING STATIONS

Omaha, Neb. Unique Features of Omaha Pumping Station and Filtration Plant. Water Works, vol. 65, no. 11, Nov. 1926, pp. 565–567, 3 figs. 50,000,000-gal.-per-day high-head pumping unit; extensive use of waterwheel-driven auxiliaries; $2500 saved annually in wash-water pumping costs.

PUMPS

Air-Lift. Air-Lift Pumping, H. T. Davey. Mech. World, vol. 80, no. 2082, Nov. 26, 1926, p. 423, 1 fig. Describes plant used for raising water from deep well to storage tank at top of tower, from which main water supply to large building is obtained.

Boiler-Feed. Boiler-Feed Pumps, D. G. McNair. Mech. World, vol. 80, no. 2080, Nov. 12, 1926, pp. 379–380, 1 fig. From point of view of keeping pump in state of efficient operation and amount of expense and labor involved thereby, independent pump, running at low speed and generally under most favorable conditions, will be much more easily kept in order, and consequently incur less labor and expense; reciprocating and centrifugal feed pumps.

Turbine. The Steam-Turbine Pump for Water Works (Die Dampfturbopumpe als Wasserwerkmaschine), Kurzak. Zeit. des Vereines deutscher Ingenieure, vol. 70, no. 46, Nov. 13, 1926, pp. 1521–1525, 6 figs. In early stages of development turbine pumps could only be used for auxiliary purposes because of their low efficiency; but they are now used to greater extent than piston pumps; describes turbine-pump installation in Tegel plant of Berlin Water Works, and results obtained.

PUMPS, CENTRIFUGAL

Characteristics. Characteristics of Centrifugal Pumps, F. Johnstone-Taylor. Mech. World, vol. 80, no. 2082, Nov. 26, 1926, pp. 419–420, 8 figs. Effects of speed increase; constant speed and constant head; variable conditions.

Self-Starting. New Types of Self-Starting Centrifugal Pumps (Neue Bauarten von selbstansaugenden Kreiselpumpen), F. Neumann. Zeit. des Vereines deutscher Ingenieure, vol. 70, no. 47, Nov. 20, 1926, pp. 1573–1577, 14 figs. Requisites of centrifugal pumps; modern types; self-starting pumps for different purposes; fire-extinguishing pumps; saving in space and weight as compared with reciprocating pumps.

PYROMETERS

Cones. Characteristics of Pyrometric Cones, C. O. Fairchild and M. F. Peters. Am. Ceramic Soc.—Jl., vol. 9, no. 11, Nov. 1926, pp. 701–743, 5 figs. Determination of characteristics under definite and reproducible conditions of heating.

Optical. Measuring High Temperatures and the Improved Filament Pyrometer (Die Messung hoher Temperaturen und das verbesserte elektrische Glühfaden-Pyrometer), M. Foerster. Wärme- u. Kälte-Technik, vol. 28, no. 22, Nov. 3, 1926, pp. 259–262, 8 figs. Development of optical radiation pyrometers; Halborn-Kurlbaun, Fery and Siemens types; measuring temperatures of 2000 to 3000 deg. cent.

R

RAILS

Breaking of. Self-Tempering and Surface-Strain Hardening of Rails in Service (Auto-trempe et écrouissage superficiels des rails en service), M. Sabouret. Revue Générale des Chemins de Fer, vol. 45, no. 2, Nov. 1926, pp. 370–393, 15 figs. Derailment of express at Grisolles, France, due to apparently perfect rail breaking into 21 pieces, which, on expert examination, was found to have been rendered brittle by skidding, etc.; proposes use of rail steel in which this hardening will increase rather than diminish.

Corrugation. Study of Corrugated Wear of Rails (Contribution à l'étude de l'usure ondulatoire des rails), C. Fremont. Génie Civil, vol. 89, no. 20, Nov. 13, 1926, pp. 425–428, 13 figs. Experiments in wear of rails by abrasion; tangential impact on tire of wheels due to sudden friction, and apparatus for recording it; study of microstructure, etc.

Joints, Welded. A New Rail Joint, W. Spraragen. Am. Welding Soc.—Jl., vol. 5, no. 11, Nov. 1926, pp. 8–9, 1 fig. Author describes new form of joint particularly adapted to metal arc welding; it is really nothing more than straight butt joint made in rail without addition of fish plates and with or without addition of base plate to give additional strength.

Transverse Fissures. A Transverse Fissure Detector. Ry. Eng. & Maintenance, vol. 22, no. 12, Dec. 1926, pp. 503–504, 4 figs. Magnetic deflectoscope, developed in Japan, is used on rails in track.

RAILWAY MOTOR CARS

Europe. Rail Motor Cars Used in France, Spain, Italy, and Southern Countries, M. F. Level. Tramway & Ry. World, vol. 60, no. 24, Nov. 11, 1926, pp. 283–284. Results obtained in use of gasoline on benzol engines; improvements in design of coaches are very desirable, but results so far obtained are of sufficiently encouraging nature to suggest use of motor coaches when conditions of traffic and gradients are suitable.

RAILWAY OPERATION

Train Control. Train Control on the Union Pacific. Ry. Elec. Engr., vol. 17, no. 11, Nov. 1926, pp. 375–380, 12 figs. Thorough training of enginemen together

with careful inspection of equipment shows excellent results on 225 miles of line.

RAILWAY REPAIR SHOPS

Compressed-Air Tools. Air-Operated Tools Help Repair Locomotives, F. W. Curtis. Am. Mach., vol. 65, no. 25, Dec. 16, 1926, pp. 979–981, 9 figs. Outline of miscellaneous tools that cut costs; forming superheater-unit bands; stripper for steam-hose fittings; benders for pipes and eyes; automatic feeding attachments.

RAILWAY SIGNALING

Day-and-Night Signals. Railway Signaling by Means of Luminous Signals, Day and Night (La signalisation des voies ferrées par signaux lumineux employés jour et nuit), J. Netter. Génie Civil, vol. 89, no. 15, Oct. 9, 1926, pp. 297–299, 4 figs. Discusses continuous use of lights in United States and in France, system of lenses used, power consumption of tungsten filament lamps, groups of signals, control; advantages.

Semaphores and Light. Southern Pacific Installs Semaphores and Light Signals on New Line. Ry. Signaling, vol. 19, no. 12, Dec. 1926, pp. 461–463, 12 figs. Operating characteristics of different types to be studied.

Testing Signals. How to Test D-C. Low Voltage Signals with a Volt-Ammeter, A. M. Weeks. Ry. Signaling, vol. 19, no. 12, Dec. 1926, pp. 466–469, 10 figs. Instructions governing method of using instrument in testing relays, circuits, and grounds.

Track Circuiting. A New Development in Single Line and Either-Way Working. Ry. Gaz., vol. 45, no. 24, Dec. 10, 1926, pp. 698–700, 3 figs. Installation on L. N. E. R. (N. E. area), in which ordinary single-line token system has been replaced by track circuiting of improved type.

RAILWAY SWITCHES

Electric. Electric Switches and Signaling (L'électricité dans l'aiguillage et la signalisation), A. Bourgain. Nature, no. 2739, Oct. 2, 1926, pp. 209–215, 17 figs. Describes Aster electric switch control and battery motor for operating switches; also Mors and Klein motors for switch and signal operation.

RAILWAY TIES

Concrete. Concrete Ties in Open Track. Elec. Traction, vol. 22, no. 12, Dec. 1926, pp. 677–678, 4 figs. New type track construction tested by Pittsburgh, Harmony, Butler & New Castle Railway Co. utilizes concrete beam tie with rails held in alignment by spot-welded tie rods.

RAILWAY TRACK

Crossings. C. & N. W. Replaces Highway Crossing with Wig-Wags, J. A. Peabody. Ry. Signaling, vol. 19, no. 12, Dec. 1926, pp. 464–466, 4 figs. Twenty-five crossings in Elgin, Ill., protected by 41 signals, with annual saving of $9213; special manual control solves difficult problem.

RAILWAYS

Mechanical Engineering. Progress in Railroad Mechanical Engineering. Mech. Eng., vol. 48, no. 12, Dec. 1926, pp. 1427–1431. Progress report contributed by Railway Division of Am. Soc. Mech. Engrs., dealing with motive power, rolling stock, trend in development, union-management coöperation and power-brake tests at Purdue Univ. Bibliography.

REFRACTORIES

Boiler-Furnace. Refractories, R. A. Sherman, W. E. Rice and L. B. Berger. Mech. Eng., vol. 48, no. 12, Dec. 1926, pp. 1389–1396, 15 figs. Investigation of boiler-furnace conditions as related to refractories service.

Refractory Materials for Boiler Furnaces (Les produits réfractaires pour foyers de chaudières), V. Bodin. Assns. Françaises de Propriétaires d'Appareils à Vapeur—Bul., nos. 24 and 25, Apr. and July, 1926, pp. 104–118 and 199–207. Discusses refractory materials in general with melting point above 1550 deg. cent.; fusibility of fireclays; production of refractories; mixing and molding, drying, baking. Use of refractories in boiler furnaces; principal tests.

Cast. Cast Refractory Blocks Give Highly Satisfactory Service. Fuels & Furnaces, vol. 4, no. 11, Nov. 1926, pp. 1339–1346. Cast refractories made by newly developed method of melting in electric furnace and pouring into molds, show remarkable resistance to erosion in glass tanks. (Abstract.) Paper read before Am. Refractories Inst.

Silacene. The Mining and Preparation of Silacene. Foundry Trade Jl., vol. 34, no. 536, Nov. 25, 1926, p. 463, 3 figs. Notes on mining and preparation of plastic refractory known as silacene.

REFRIGERATING MACHINES

Electrolux. The Electrolux Refrigerator. Ice & Cold Storage, vol. 29, no. 344, Nov. 1926, pp. 297–298. In this system necessity for two regulating valves and mechanically operated pump are avoided by introducing sufficient inert gas into evaporator and absorber to produce pressure in these vessels equal to difference between condenser and evaporator, and so arranging apparatus that hydrogen circulates continuously between evaporator and absorber. Review of paper by D. B. Bremner before Brit. Cold Storage and Ice Assn., and discussion.

RIVETED JOINTS

Behavior Under Load. An Investigation of the Behavior and of the Ultimate Strength of Riveted Joints under Load, E. L. Gayhart. Soc. Naval Architects & Mar. Engrs.—Advance Paper, no. 5, for mtg. Nov. 11–12, 1926, 14 pp., 12 figs. Study, under tensile forces, of slip phenomena and stress distribution in riveted joints; effect upon ultimate strength of joint of variations in rivet spacing, and effect of using rivets of grade softer than material of plates.

Tests. Tests of Large Riveted Joints of Various Steels. Eng. News-Rec., vol. 97, no. 22, Nov. 25, 1926, p. 864. Navy tests of 51 joints show best results with soft rivets; slip begins at shear of 6500 lb. per sq. in.

RIVETS

Specifications. Tentative American Standards for Tinners', Coopers', and Belt Rivets, Small Rivets, and Plow Bolts. Mech. Eng., vol. 48, no. 12, Dec. 1926, pp. 1480–1484, 12 figs.

ROLLING MILLS

Blooming Mills. Continuous 42-In. Blooming Mill. Iron Age, vol. 118, no. 24, Dec. 9, 1926, pp. 1621–1625 and 1671, 8 figs. Ford plant, using 1500-lb. ingots, expected to produce 100,000 tons per month; unique housings and manipulators.

Electric Drive. Electricity in Steel Manufacture. Elec. Engr. Australia & New Zealand, vol. 3, no. 7, Oct. 15, 1926, pp. 249–250, 1 fig. Details of electrical equipment of Victoria Iron Rolling Co. in Australia; scrap is melted and refined in 7-ton electric steel furnace of Heroult type, which has melted heats up to 10 tons; forgings up to $16^1/_2$ tons weight are made on 500-ton Davy steam-hydraulic press; there are two rolling mills for manufacturing bar, rod and special sections; mill is driven by 1000-hp. Metropolitan Vickers 6600-volt, three-phase induction motor.

Hot Rolling. Recent Improvements in Hot Rolling Mills (Les récents perfectionnements apportés aux laminoirs à chaud), P. Brenier. Technique Moderne, vol. 18, nos. 19 and 21, Oct. 1 and Nov. 1, 1926, pp. 577–585, 37 figs., and 650–653, 6 figs. Oct. 1: Discusses recent progress in blooming mills, two- and three-high mills; merchant, iron sheet-rolling and wire mills, etc.; their operation; auxiliaries. Nov. 1: Operation of mill trains and auxiliaries, elastic drive and reduction gear, cooling beds, etc.

I-Beams. Experimental Investigations on the Flow of Material in the Rolling of I-Beams (Experimentelle Untersuchungen des Materialflusses beim Walzen von Trägern), N. Metz. Stahl u. Eisen, vol. 46, Nov. 18, 1926, pp. 1577–1582, 36 figs. partly on supp. plates. Method of making deformations visible; by inserting screws in different parts of material to be rolled, it is possible to follow movement of material in open and closed passes; results afford explanation for high pressure and power required in rolling of beams, as compared with flat iron.

Manipulators. Billet-Piercing Mill Manipulator. Iron Age, vol. 118. no. 25, Dec. 16, 1926, pp. 1683–1684, 1 fig. Device carrying two mandrels, one being in action while other is being unloaded.

S

SCREW THREADS

Cutting. Cutting and Testing Threads (Gewindeherstellung und Gewindeprüfung), W. T. Schaurte. Maschinenbau, vol. 5, nos. 20 and 21, Oct. 21 and Nov. 4, 1926, pp. 927–931 and 980–983, 23 figs. Discusses standardization, metric and Whitworth thread, pitch, flanks, clearance and tolerance, nut and bolt threads, cutting and grinding.

Generators. The Cornelis Thread Generator. Mech. World, vol. 80, no. 2080, Nov. 12, 1926, pp. 386–387, 2 figs. Automatic generator introduced by Blundstone Eng. Service, Ltd., in which work is rotated as in lathe, and generating tool, similar to Fellows gear cutter, rotates over work in unison with thread, and simultaneously travels along axially over face of work.

Milling Machines. Thread Miller Is Adapted for Production of Differential Carriers, W. L. Carver. Automotive Industries, vol. 55, no. 24, Dec. 9, 1926, pp. 972–973, 4 figs. Hall planetary machine offers interesting possibilities in accurate boring and shouldering operations.

SEAPLANES

German Competition. German Seaplane Competition (Erfahrungen aus dem Deutschen Seeflug-Wettbewerb 1926), F. Seewald. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 17, no. 20, Oct. 28, 1926, pp. 431–435, 1 fig. Competition was partly matter of technical analysis, partly matter of actual flying; planes were compared to certain standard plane as to aeronautical coefficients, motor weight per hp., loaded weight to empty weight, and as to computed radius of action; on the whole, method worked out successfully and can be made basis for further developments; flying competition consisted of flight over total distance of 4000 km.; it was found in this connection that no machine came up to theoretical performance. See brief translated abstract in Automotive Abstracts, vol. 4, no. 12, Dec. 20, 1926, pp. 365–366.

Results of German Seaplane Flights (Der Deutsche Seeflug-Wettbewerb 1926). Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 17, no. 20, Oct. 28, 1926, pp. 435–449, 21 figs. Contains articles by F. Seewald, H. Blank and F. Liebers, Gosslau, Longolius, Baatz, Gronau, R. Spies, W. Friedensburg and H. v. Reppert on performances of individual planes; these flights seem to have resulted in contest between Junkers, Heinkels and "Luftfahrzeug-Gesellschaft;" Heinkel uses steel tubes to considerable extent; these behaved well, and more extended use of them is expected.

SHEARS

Gate. Gate Shears (Tafelscheren), O. Weil. Praktischer Maschinen-Konstrukteur, vol. 59, no. 39–40, Oct. 2, 1926, pp. 438–442, 9 figs. Discusses development in design leading to greater safety in operation, quicker working and more convenient control; John patent machine with transverse cutting arrangement, etc.

SPRINGS

Automobile. Automobile Springs (Automobilwagenfedern), W. Schlachter. Motorwagen, vol. 29, no. 27, Sept. 30, 1926, pp. 637–642, 10 figs. Calculation of stress of front springs on cars with 4-wheel brakes.

Friction and Lubrication. Leaf-Spring Friction and Lubrication (Ueber Blattfederreibung und Schmierung), O. Günther. Motorwagen, vol. 29, no. 27, Sept. 30, 1926, pp. 642–644, 3 figs. Discusses means of reducing spring reduction; qualities which spring lubricant should possess.

Machine-Tool Jigs. Springs in Modern Work-Holding Devices (Die Feder in der neuzeitlichen Hochleistungsspannvorrichtung), A. von Kilian. Werkstattstechnik, vol. 20, no. 22, Nov. 15, 1926, pp. 669–671, 21 figs. Discusses convenient use of springs in various types of semi-automatic holding devices for milling cutters, presses, etc., and gives examples.

STANDARDIZATION

Developments. Standardization, R. Bärmig. Eng. Progress, vol. 7, no. 11, Nov. 1926, pp. 305–308, 5 figs. Reviews standardization movements in all industrial countries.

German N.D.I. Reports. Report of German Industrial Standards Committee (N.D.I.-Mitteilungen), W. Reichardt. Maschinenbau, vol. 5, no. 21, Nov. 4, 1926, pp. 1011–1014. Proposed standards for furnace fronts for ceramic furnaces; quality and acceptance regulations for bolts and nuts.

Report of German Industrial Standards Committee (N.D.I. Mitteilungen), W. Reichardt. Maschinenbau, vol. 5, no. 22, Nov. 18, 1926, pp. 1055–1056. Proposed standards for grip chucks, feed chucks, lock jaws for lathes; refractory bricks.

STEAM

High-Pressure. Recent Experiments on the Properties of Steam at High Pressures, H. L. Callendar. Engineering, vol. 122, no. 3177, Dec. 3, 1926, pp. 681–682, 5 figs. Account of author's experiments; in general, results show that at high superheats Callendar tables were very accurate, and under these conditions properties of steam agreed with simple Joule-Thomson equations. Lecture before Roy. Soc. of Arts.

The Economic Value of Increased Steam Pressure, H. L. Guy. Engineer, vol. 142, nos. 3696 and 3697, Nov. 12 and 19, 1926, pp. 534–537 and 561–563, 18 figs. Considers how far increase of steam pressure affects efficiency of operation; some of its effects on character and cost of individual units comprising whole plant, and what guidance can be obtained in selection of pressure appropriate to any particular case. Paper read before Instn. Mech. Engrs. See also Engineering, vol. 122, no. 3175, Nov. 19, 1926, pp. 643–646, 12 figs.

STEAM ACCUMULATORS

Electrically Heated. Methods for Testing Thermal Properties of Electrically Heated Hot-Water Accumulators (Untersuchungsmethoden für die Beurteilung der wärmetechnischen Eigenschaften von elektrischenbeheizten Warmwasserspeichern), M. von Schmidt. Elektrizitätswirtschaft, vol. 25, no. 420, Nov. 1, 1926, pp. 485–488, 2 figs. Variation of thermal efficiency with difference in operation, methods of determining efficiency, heat losses, cooling curves, etc.

STEAM ENGINES

Extraction. A New Single-Cylinder Extraction Engine (Eine neue Einzylinder-Dampfmaschine für Dampfentnahme von O bis 100%). Wärme, vol. 49, no. 41, Oct. 8, 1926, pp. 724–726, 4 figs. Engine, developed by Starke & Hoffmann, with steam extraction from 0 to 100 per cent; both power output and extracted steam can be varied independently of each other by means of double-valve exhaust control with non-return device which closes space between two exhaust valves against back-pressure line; different back pressures can be employed on two sides of cylinder, if desired; engines of this type have been in satisfactory service for several years. See brief translated abstract in Power Engr., vol. 21, no. 249, Dec. 1926, pp. 468–469.

Steam Rates and Thermal Efficiency. Steam Rates and Thermal Economy. Power, vol. 64, no. 22, Nov. 30, 1926, p. 802. Points out that it is becoming more and more essential that thermal efficiency be quoted in addition to steam rates in comparing performance; effect of reheating.

STEAM PIPES

Heat-Loss Measurement. Tests and Experiences with Heat-Flow Meter of Dr. Schmidt (Versuche und Erfahrungen mit dem Wärmeflussmesser von Dr. Schmidt), Sauermann. Archiv für Wärmewirtschaft, vol. 7, no. 11, Nov. 1926, pp. 327–328, 1 fig. Results of tests on instrument for measurement of heat losses in pipe lines and for determination of thermal conductivity of insulations.

Joints. The Luc-Denis Articulated Steam Pipe Joint. Mar. Engr. & Motorship Bldr., vol. 49, no. 592, Dec. 1926, p. 467, 1 fig. Particulars of novel type of joint, emanating from France, which has been successfully used for high-pressure, high-temperature steam pipe lines.

STEAM POWER PLANTS

Desuperheaters. New Field for Desuperheaters, B. N. Broido. Power, vol. 64, no. 22, Nov. 30, 1926, pp. 803–805, 3 figs. By using desuperheater and reducing valve in tie line between new and old sections of plant, emergency connection can be maintained while taking advantage, in new section, of recent advances in steam temperature and pressure; operation of new type of desuperheater in which no water comes in contact with steam.

Engineering, Progress in. Progress in Steam-Power Engineering. Mech. Eng., vol. 48, no. 12, Dec. 1926, pp. 1419–1421. Progress report contributed by Power Division of Am. Soc. Mech. Engrs. dealing with boiler-room equipment, turbine room, power-station heat cycles, and industrial power.

Industrial. Comparative Costs of Industrial Power-Plant Operation, H. Anderson. Power, vol. 64, no. 26, Dec. 28, 1926, pp. 970–973, 3 figs. Analysis of four plants, designed for steam pressures ranging from 130 to 600 lb., shows that up to 400 lb. there is material gain in economy of operation over lower-pressure plants, but beyond this point economic gain is small.

Office Buildings. Operating a Private Power Plant in Competition with Purchased Power, T. V. Balch. Engrs. & Eng., vol. 43, no. 10, Oct. 15, 1926, pp. 269–277. Presents system of operating combined plant, generating electric energy and steam for servicing large high-class office building.

STEAM TURBINES

Clearance Pressure and Rotor Loss. Clearance Pressure and Rotor Loss in Steam Turbines (Spaltdruck und Laufradverlust), H. Faltin. Zeit. des Vereines deutscher Ingenieure, vol. 70, no. 47, Nov. 20, 1926, pp. 1582–1588, 12 figs. Account of tests on steam-turbine pressure stage; determination of speed diagrams; results show that rotor losses are dependent on clearance pressure (degree of reaction) and on rotor drop.

Impulse. Impulse Steam Turbines, W. J. Kearton. Elecn., vol. 97, no. 2527, Nov. 5, 1926, pp. 532 and 536, 2 figs. Prediction of heat drop and pressure; application to existing types of machine; effect of throttling factor; distribution at varying loads. Paper read before Sect. G of Brit. Assn.

Marine. Recent Turbine Practice and Its Application to Ship Propulsion, E. A. Kraft. Engineer, vol. 142, no. 3699, Dec. 3, 1926, pp. 603–604, 3 figs. Considers more important recent advances in turbine design; means for increasing heat drop through turbine; improvements in high pressure; emphasizes necessity for high vacuum; improvements in working cycle; considers relative claims of regenerative feed heating and interstage reheating; principles underlying design of economical turbine plants; describes machinery arrangement of King George. Paper read before Schiffbautechnische Ges.

Rotors. Structural Features of the Steam Turbine Rotor, J. M. Downer. Gen. Elec. Rev., vol. 29, no. 12, Dec. 1926, pp. 829–832, 8 figs. Progress in turbine design and ratings; extreme care in manufacture of turbine wheels; magnetic and other tests; blade materials and methods of fastening; balance.

STEEL

Gages, Wear of. Wear of Steels with Particular Reference to Plug Gages, H. J. French and H. K. Herschman. Am. Soc. Steel Treating—Trans., vol. 10, no. 5, Nov. 1926, pp. 683–712 and (discussion) 713–717 and 813, 10 figs. New gagewear testing machine is described and results obtained by its use are discussed for wet sliding friction of metal on metal and wear by abrasives; comparisons of service wear tests at different plants with results obtained in laboratory with gage-wear tester; data presented to show that file hardness is not criterion of good wear resistance of gages; chromium-plated steel gages are likewise compared with gages made from heat-treated steels of customary types.

High-Carbon. The Constitution of Steel and Cast Iron, F. T. Sisco. Am. Soc. Steel Treating—Trans., vol. 10, no. 5, Nov. 1926, pp. 800–813, 3 figs. Deals with structure of high-carbon steels, and structural changes in these steels when they are heated and cooled through transformation ranges; methods for calculation of amount of various structural constituents present in hypoeutectoid, eutectoid, and hypereutectoid steels.

High-Speed. See STEEL, HIGH-SPEED.

Nickel. See NICKEL STEEL.

Overstraining by Bending. The Overstraining of Steel by Bending, J. Muir and D. Binnie. Engineering, vol. 122, no. 3179, Dec. 17, 1926, pp. 743–744, 5 figs. Reference to paper by A. B. W. Kennedy, published in same journal June 15, 1923, describing experiments showing how calculated maximum stress at yield point observed in bending test depends on shape of cross-section of steel beams used; shows that increase in yield point is merely apparent; some material in outside fibers of bent beam yields when stress, as calculated by elementary theory of bending, reaches yield-point stress as given by simple tensile test, but there is then new distribution of stress which necessitates modification of elementary theory.

Temper Brittleness. Temper Brittleness of Steels (La fragilité de revenu des aciers), L. Guillet and M. Ballay. Revue de Métallurgie, vol. 23, nos. 9 and 10, Sept. and Oct. 1926, pp. 507–520 and 605–617, 21 figs. Concludes that chemical analysis does not indicate with exactitude degree of susceptibility of metal to temper brittleness, but investigation shows that in nearly all cases it is possible to prevent temper brittleness by a simple treatment even if a susceptible steel is employed; after a steel has become brittle, regeneration can be effected by heating above 600 deg. and cooling rapidly; theories of temper brittleness. Bibliography.

Tool. See TOOL STEEL.

STEEL CASTINGS

Fatigue Strength. Tests of the Fatigue Strength of Cast Steel, H. F. Moore. Univ. of Illinois Bul., vol. 23, no. 44, July 6, 1926, pp. 5–20, 37 figs. Chemical composition and heat treatment of steels; test specimens and methods of testing; test data and results; report of investigation conducted by Engineering Experiment Station of University of Illinois in cooperation with American Steel Foundries.

STEEL, HEAT TREATMENT OF

Annealing. The Transformations in Hardened Steel Due to Annealing (Die Umwandlungen des gehärteten Stahles beim Anlassen), H. Hanemann and L. Traeger. Stahl u. Eisen, vol. 46, no. 44, Nov. 4, 1926, pp. 1508–1514, 9 figs. Points out that annealing temperature of only 100 deg. has a decided influence on hardened steel; when annealed for duration of 14 hours, hardness of a carbon steel is completely changed by heat of boiling water; for tool steel, annealing temperature of 200 to 300 deg. is customary; if it is desired to make a hardened steel volumetrically constant for temperatures above 280 deg., an annealing temperature of 400 deg. is necessary.

Electric. Electric Heat Treatment of Steel, E. P. Barfield. Elecn., vol. 97, no. 2530, Nov. 26, 1926, pp. 614–615, 3 figs. Improvements in furnaces; classification of equipment; automatic temperature control.

Facts and Principles. Facts and Principles Concerning Steel and Heat Treatment, H. B. Knowlton. Am. Soc. Steel Treat.—Trans., vol. 10, no. 6, Dec. 1926, pp. 971–985, 4 figs. Properties and uses of alloy steels other than tool steels in general; discussion of various types of nickel steels.

Hardening. New Process for Superficial Hardening of Steels by Means of Nitration (Nouveau procédé de durcissement superficiel des aciers par nitruration), L. Guillet. Société des Ingénieurs Civils de France—Mémoires et Compte Rendu, vol. 79, nos. 7 and 8, July-Aug. 1926, pp. 519–523. New process due to Fry; finished pieces of certain special steels are heated to 500 deg. in ammonia atmosphere under pressure; scleroscope and ball-hardness figures, etc.

The Hardening of Steel (Ueber die Härtung des Stahles), H. Hanemann. Stahl u. Eisen, vol. 46, no. 46, Nov. 18, 1926, pp. 1585–1587, 1 fig. Compares Maurer hardening theory with Hanemann-Schrader theory; difference between the two consists in conception of position of carbon atoms in martensite.

Standard Specifications. Proposed New Heat-Treatments. Soc. Automotive Engrs.—Jl., vol. 19, no. 6, Dec. 1926, p. 556. Subdivision on Physical-Property Charts recommended heat treatments for S.A.E. Steel 4615, intended primarily for case-hardening.

STEEL, HIGH-SPEED

Cobalt Steel. Properties of High-Speed Cobalt Steel (Eigenschaften cobaltlegierter Schnellarbeitsstähle), W. Oertel. Motorwagen, vol. 29, no. 30, Oct. 31, 1926, pp. 742–746, 7 figs. Experiment with two cobalt steels in shop with 10 lathes showed that 5 per cent cobalt steel made possible saving of $1500 per year, while one containing 8 per cent made possible saving of over $3000; metallography of these steels.

STREET RAILWAYS

Cars. A New Jointed Six-Axle Tram Car. Eng. Progress, vol. 7, no. 11, Nov. 1926, p. 294, 3 figs. Car installed on Duisburg street railway forms link between rigid single cars with large passenger space and tram trains consisting of motor car and several trailers; basic idea was to link together two equal cars in such way as to form single car, without materially reducing flexibility of subdivided train.

Light Electric Street Cars (Voiture automotrice électrique de tramways, type leger), A. Lartigue. Electricité & Mécanique, no. 14, Sept.-Oct. 1926, pp. 1–12, 19 figs. New car used by Paris Transport Co.; mechanical details, including chassis, suspensions, wheels and axles, brakes; electric details, including Thomson-Houston motors, switches, etc.; power consumption, motor heating in operation.

Street Cars of Aluminum. Iron Age, vol. 118, no. 24, Dec. 9, 1926, p. 1633. Aluminum street car built by Cleveland Ry. Co. for experimental purposes; aluminum-alloy parts of car are in form of forgings, castings, light plates, tubing and standard formed sections; few parts of body are of steel.

STRESSES

Concentration. An Investigation of Stress Concentration by Means of Plaster-of-Paris Specimens, R. E. Peterson. Mech. Eng., vol. 48, no. 12, Dec. 1926, pp. 1449–1452, 9 figs. Author shows that determination of stress-concentration factors by means of plaster-of-paris specimens is simple means of obtaining results which are close to or on safe side of fatigue results; mathematical stress-concentration factors based on theory of elasticity, as well as photoelastic factors differ considerably from fatigue results for small holes and small fillets; three-dimensional problems in stress distribution, which cannot be solved photoelastically, may be investigated by tests of plaster-of-paris specimens.

SUPERHEATERS

Headers for. Resistance of Rectangular Tube-Shape Containers Against Internal Pressure (Ueber die Festigkeitseigenschaften vierkantiger röhrenförmiger Behälter gegen inneren Ueberdruck), R. Fischer. Praktischer Maschinen-Konstrukteur, vol. 59, no. 35–36, Sept. 4, 1926, pp. 390–394, 7 figs. Discusses determination of wall thickness for rectangular pipes as used for superheaters, sectional chambers, etc.; develops formulas and gives examples.

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TERMINALS, RAILWAY

Freight. New Great Western Railway Goods Depot at Bristol, F. W. Lampitt. Ry. Gaz., vol. 45, no. 22, Nov. 26, 1926, pp. 638–639 and 646, 2 figs. New station will provide accommodation for 748 cars, of which 408 will be under cover; it is 630 ft. long and 400 ft. wide, and will contain eight platforms as well as end platform or circulating area 40 ft. in width.

The Railroad Freight-Terminal, B. V. Crandall. Soc. Automotive Engrs.—Jl., vol. 19, no. 6, Dec. 1926, pp. 601–608. Discusses characteristics of two kinds of terminal, final and intermediate; considerations involved in locating terminals properly; points out urgent need for proper coördination of transportation facilities including motor transport; trap-car system used by railroads.

TEXTILE INDUSTRY

Mechanical Engineering in, Progress of. Progress in Textile Mechanical Engineering. Mech. Eng., vol. 48, no. 12, Dec. 1926, pp. 1425–1426, 2 figs. Progress report contributed by Textile Division of Am. Soc. Mech. Engrs., dealing with developments in textile industry, machinery, power, research, etc.

TOOL STEEL

Non-Deforming. The Nature of Oil Hardening Non-Deforming Tool Steels, E. C. Bain and M. A. Grossmann. Am. Soc. Steel Treat.—Trans., vol. 10, no. 6, Dec. 1926, pp. 883–895 and (discussion) 896–897, 9 figs. Fundamental characteristics of oil-quenching type of tool steels; data were obtained from measurements of hardness, impact, strength, change of dimension, and determination of X-ray crystal structure; deductions are drawn as to preservation and subsequent destruction of austenite and this phenomenon is correlated with practical behavior of steel in its various uses.

TORSION

Testing Machines. Apparatus for Testing Wire by Torsion. Engineering, vol. 122, no. 3176, Nov. 26, 1926, p. 679, 2 figs. Apparatus placed on market by A. J. Amsler & Co., Switzerland, consists of vertical column having three horizontal arms and base support.

TRACTORS

Farm. Motor Tractors for Industrial and Agricultural Purposes, G. Becker. Eng. Progress, vol. 7, no. 11, Nov. 1926, pp. 295–299, 6 figs. Comparison of effective tractive forces on field and road; arrangement of drive in wheel and caterpillar tractors; traveling speed and stress on roads; losses in driving and traveling gear; design; fuel consumption and wear of engine.

Industrial Application. Industrial Application of Tractors, W. Parrish. Soc. Automotive Engrs.—Jl., vol. 19, no. 6, Dec. 1926, pp. 655–656, 6 figs. Describes application in lumber industry, coal mining, transportation of materials about manufacturing plants, freight handling, etc.

U

UNIVERSAL JOINTS

Application in Design. Action, Application and Construction of Universal Joints, C. W. Spicer. Soc. Automotive Engrs.—Jl., vol. 19, no. 6, Dec. 1926, pp. 625–634, 28 figs. Universal joints are divided into three general classes: grease-lubricated, oil-lubricated and non-lubricated; describes joints of several types made by various companies.

V

VARNISHES

China-Wood-Oil. Some Developments in Controlling China Wood Oil Varnishes, W. W. Bauer. Ind. & Eng. Chem., vol. 18, no. 12, Dec. 1926, pp. 1249–1251, 2 figs. Proposes method for measuring crystallizing tendency of China wood oil varnishes, and describes apparatus employed.

VENTILATION

Ejector. Ejector Ventilation, G. Proeschel. Colliery Eng., vol. 3, no. 33, Nov. 1926, pp. 474–475, 5 figs. Method of calculation based on investigations of Rateau and Zeuner; application to mine ventilation; numerical example. Translated from Arts & Metiers.

Schools. The Mechanical Ventilation of the St. Louis Schools, E. S. Hallett. Heat. & Vent. Mag., vol. 23, no. 12, Dec. 1926, pp. 61–64 and 69, 2 figs. Diseases removable by ventilation; new sources of air pollution; bad odors in city air; problems of heat control not mechanical, but personal; comparison of various types of ventilation.

W

WASTE

Reclamation. The Recovery and Use of Waste Materials, I. B. C. Kershaw. Indus. Chem., vol. 2, no. 22, Nov. 1926, pp. 485–488, 2 figs. Deals with mining and metallurgical wastes; recovery of metals in electroplating works, slate-quarrying refuse; fire-proof tiles from waste lime; recovery of tin and zinc.

WOOD

Protection from Moisture. Protecting Wood from Moisture, M. E. Dunlap. Ind. & Eng. Chem., vol. 18, no. 12, Dec. 1926, pp. 1230–1232, 1 fig. Results of experiments; effect of number of coats; relative efficiency of various coatings; prevention of warping.

THE ENGINEERING INDEX

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Mechanical Engineering Section

THE ENGINEERING INDEX presents each month, in conveniently classified form, items descriptive of the articles appearing in the current issues of the world's engineering and scientific press of particular interest to mechanical engineers. At the end of the year the monthly instalments are combined along with items dealing with civil, electrical, mining and other branches of engineering, and published in book form, this annual volume having regularly appeared since 1906. In the preparation of the Index by the engineering staff of The American Society of Mechanical Engineers some 1200 technical publications received by the Engineering Societies Library (New York) are regularly reviewed, thus bringing the great resources of that library to the entire engineering profession.

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ACCOUNTING

Automatic Machines for. Automatic Machines for Accounting and Statistical Work (Les machines automatiques de compatibilité et de statistique), J. Sindou. Annales des Postes Télégraphes et Téléphones, vol. 15, no. 10, Oct. 1926, pp. 837–859, 11 figs. Describes perforated card systems, tabulating systems and apparatus used, such as Hollerith system; enumerates many uses of these tabulating systems, in railway insurance and other offices.

AERONAUTICS

Development, 1926. Progress—1926, W. L. Le-Page. Aviation, vol. 22, no. 1, Jan. 3, 1927, pp. 19–23, 3 figs. Review of developments in past twelve months which, it is claimed, were most significant in history of aeronautical development.

AIR

Joule-Thomson Effect for. The Joule-Thomson Effect for Air, N. Eumorfopoulos and J. Rai. London, Edinburgh & Dublin Philosophical Mag., vol. 2, no. 11, Nov. 1926, pp. 961–975, 7 figs. Experiments undertaken with object of determining thermodynamic correction to gas thermometer.

Viscosity. The Effect of Temperature on the Viscosity of Air, F. A. Williams. Roy. Soc.—Proc., vol. 113, no. A763, Nov. 1, 1926, pp. 233–237. Remarks on criticisms by A. O. Rankine of results obtained from, and experimental method employed in, determination of temperature coefficient of viscosity of air by present author.

AIR COMPRESSORS

Frosting. Frosting of Air Machines, W. V. Fitzgerald. Power, vol. 64, no. 25, Dec. 21, 1926, pp. 944–946. Why moisture appears in compressed air; influence of atmospheric humidity; benefit of stage compression.

High-Pressure. Weir's High-Pressure Compressor. Mar. Engr. & Motorship Bldr., vol. 50, no. 593, Jan. 1927, pp. 14 and 21, 2 figs. New three-stage machine of sound design.

AIR CONDITIONING

Air Filters. An Improved Simple Method of Determining the Efficiency of Air Filters, H. G. Tufty and E. Mathis. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 33, no. 1, Jan. 1927, pp. 1–10, 4 figs. Method of testing developed by author known as Tufty method, which is claimed to be very simple; there is no delicate or complicated apparatus required.

Humidification in Residences. Humidifying Warm Air in Residences, R. J. Percival. Can. Engr., vol. 52, no. 1, Jan. 4, 1927, pp. 107–108, 1 fig. Air in most homes has low relative humidity and requires additional moisture to secure healthy conditions and greater degree of comfort; conditions obtaining in house equipped with humidifier in basement.

AIRCRAFT

French Design. The Trend of Aircraft Design in France, W. H. Sayers. Aeroplane, vol. 31, nos. 25 and 26, Dec. 22 and 29, 1926, pp. 844–848 and 872, 874 and 876, 12 figs. Impressions based on observations at Paris Aeronautical Show; in matter of design there is considerable difference between British and French practice; performance figures; strength and structure weight; types of construction; metal construction; protection against corrosion; controls and engine installations; fuel systems.

AIRPLANE ENGINES

Bailey. The Bull's Eye Bailey 140 HP. Engine. Aviation, vol. 22, no. 1, Jan. 3, 1927, pp. 46 and 48, 2 figs. New 7-cylinder air-cooled radial engine for commercial airplanes.

Beardmore. The Beardmore "Cyclone" Aircraft Engine. Engineer, vol. 142, no. 3702, Dec. 24, 1926, pp. 695–697, 2 figs. Six-cylinder gasoline engine designed for maximum output of 950 b.hp.; test results and scope of application.

France. Progress in Airplane-Engine Design (Nouveaux Progrès dans la Construction des Moteurs d'Aviation), H. de Graffigny. Revue Industrielle, vol. 50, nos. 2206 and 2209, Sept. and Dec. 1926, pp. 385–393 and 536–541, 19 figs. Engines taking part in recent 240-hour endurance test; Lorraine, Panhard, 420-hp. Renault, 500-hp. Renault, 500-hp. Farmer engines; Hispano-Suiza and Curtiss high-speed engines, etc. Dec: 450-hp. air-cooled Jupiter engines; fuel consumption per hour for given speed and power, etc.

Paris Show. Engines at Paris Aeronautical Show (Les Moteurs). Aérophile, Dec. 3, 1926, pp. 58–70, 19 figs. Gives list of exhibits and chief characteristics.

The Tenth French Aero Show. Aeroplane, vol. 31, no. 24, Dec. 15, 1926, pp. 782–788 and 805–815, 47 figs. Includes list of engines exhibited, alphabetically arranged according to makers, giving chief characteristics.

AIRPLANE PROPELLERS

Metal. Further Discussion on Metal Propellers. Aviation, vol. 21, no. 26, Dec. 27, 1926, pp. 1082–1083. Twisted duralumin propellers not basically weak; minor change will prevent fatigue limit being reached.

AIRPLANES

Albatros. The Albatros L. 68A School Machine. Flight (Aircraft Engr.), vol. 18, no. 52, Dec. 30, 1926, pp. 869–870, 2 figs. 100-hp. Siemens radial air-cooled engine.

Curtiss Pursuit. The Development of the Curtiss Hawk. Aviation, vol. 22, no. 1, Jan. 3, 1927, pp. 24–25, 4 figs. Curtiss pursuit planes for U. S. Army and Navy developed along specialized lines.

Design Problems. Technical Problems in German Airplane Construction (Technische Gegenwartsfragen im deutschen Flugzeugbau), H. Herrmann. Berichte u. Abhandlungen der Wissenschaftlichen Gesellschaft für Luftfahrt, no. 13, May 1926, pp. 76–85, 18 figs. Discusses means of improving total efficiency, by reduction of all resistances in propeller path, by adapting propeller pitch to reduced velocity of incoming current etc.; means of increasing size of planes; arrangement of engines.

Flying Boats. See FLYING BOATS.

French Design. Tendencies of Design at the Paris Show, F. M. Green. Flight (Aircraft Engr.), vol. 18, no. 52, Dec. 30, 1926, pp. 108–109. Author attempts to explain differences in development on continent and in England. See also article by J. D. North, pp. 103–105 and 108, giving author's impression of show.

German. New German Passenger Aircraft, Oefele. Eng. Progress, vol. 7, no. 12, Dec. 1926, pp. 313–317, 13 figs. Details of Albatros L. 73, Dornier "Merkur," Dornier giant hydroplane "Superwal;" Rohrbach airplanes Ro VII and Ro VIII, Udet "Kondor"-type passenger airplane with 4 engines, Junkers super-airplane "G31."

German Competition. The Otto Lilienthal Competition (Der Otto Lilienthal-Wettbewerb), G. Madelung. Berichte u. Abhandlungen der Wissenschaftlichen Gesellschaft für Luftfahrt, no. 13, May 1926, pp. 114–127 and (discussion) 127–128, 32 figs. Among contesting machines were 6 light planes, 5 school training planes, 1 commercial plane and 1 special machine which cannot be classed in any of three other groups; technical-efficiency trials; measurements and results.

Gliders. Flutter Observations on the Glider Rheinland (Schwingungserscheinungen des Segelflugzeugs Rheinland), F. N. Scheubel. Berichte u. Abhandlungen der Wissenschaftlichen Gesellschaft für Luftfahrt, no. 13, May 1926, pp. 103–107, 11 figs. Results of investigation carried out at Aerodynamical Institute of Technical High School in Aix-les-Chapelles, to study peculiar flutter observed in monoplane which took part in Rhön competition in 1923.

Industrial Applications. Industrial Applications of Aircraft. Engineering, vol. 122, no. 3180, Dec. 24, 1926, pp. 776–777. Application to agricultural and crop production; prevention of forest fires; police duties and publicity.

Johnson. The Johnson Twin-60 Airplane. Aviation, vol. 22, no. 1, Jan. 3, 1927, pp. 40, 42 and 44, 3 figs. New two-seater twin-engine light plane for commercial or private flying, equipped with two 32-hp. twin-cylinder Cherub air-cooled engines.

Paris Show. Aircraft at the Paris Show. Flight (Aircraft Engr.), vol. 18, no. 52, Dec. 30, 1926, pp. 109–110 and 106–107. Presents table giving characteristics of airplanes exhibited at show.

Highlights of the Paris Show, J. Jayide. Aviation, vol. 22, no. 2, Jan. 10, 1927, pp. 78–80, 6 figs. Progress in airplane design indicated in certain fields. See also succeeding article by L. d'Orcy, pp. 81–86 and 88–89, 11 figs., describing some of exhibits; also table of characteristics pp. 90–91.

On the Tenth French Aero Show. Aeroplane, vol. 31, no. 23, Dec. 8, 1926, pp. 701–708A, 710, 719 and 737–740, 56 figs. Aeronautical tendencies; review of exhibits, alphabetically arranged according to makers.

Paris Aeronautical Show (L'Exposition Officielle). Aérophile, Dec. 3, 1926, pp. 16–48, 45 figs. Gives list of exhibits including main characteristics.

Tenth Aeronautical Show, Paris (Le Dixième Salon de L'Aèronautique). Aéronautique, vol. 8, no. 91, Dec. 1926, pp. 393–418, 68 figs. Commercial airplanes, seaplanes, military planes, training planes, etc., exhibited, and their chief characteristics.

The Paris Aero Show 1926. Flight (Aircraft Engr.), vol. 18, nos. 50 and 51, Dec. 16 and 23, 1926, pp. 823–835 and 843–855, 57 figs. Calls attention to outstanding features of more interesting machines exhibited.

Seaplanes. See SEAPLANES.

Stall-Proof. Stall-Proof Airplanes (Absturzsichere Flugzeuge), G. Lachmann. Berichte und Abhandlungen, no. 13, May 1926, pp. 86–90, 10 figs. Also translation in Nat. Advisory Committee for Aeronautics—Tech. Memorandum, no. 393, Jan. 1927, 14 pp., 10 figs. Author discusses following questions: Is danger of stalling necessarily inherent in airplane in its present form and structure, or can it be diminished or eliminated by suitable means? Do we possess such means or devices and how must they operate? In this connection he devotes special attention to exhibition of stall-proof airplanes by Fokker under auspices of English Air Ministry, which took place in Croydon, Apr. 1926.

Note.—The abbreviations used in indexing are as follows:

Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

Stalled Flight, Prevention of. Devices for Prevention of Stalled Flight (Les appareils avertisseurs ou correcteurs de perte de vitesse), P. Mazer. Aéronautique, vol. 8, no. 89, Oct. 1926, pp. 333–338, 5 figs. Defines conditions for flight of airplane and states causes of stalled flight in different cases where it can occur; describes different indicating devices; Badin and Dugit anemometric indicators with venturi and pitot tubes are now in use; Constantin angle-of-attack indicator; warning and preventive devices. See also translation in Nat. Advisory Committee for Aeronautics—Tech. Memo. no. 389, Nov. 1926, 13 pp. 4 figs.

Transoceanic. The Transoceanic Airplane (Betrachtungen über das Trans Oceanflugzeug), E. Rumpler. Schiffbau, vol. 27, no. 22, Nov. 17, 1926, pp. 642–652, 20 figs. Relationship between ship and airplane construction; problem of safety and economy in transoceanic flight; in author's opinion, larger machines than are now built would be necessary to meet these requirements; details of design developed by author which, he believes, would be suitable for transoceanic flight.

Wings. Measuring Distribution of Velocity at the Boundaries of a Model Bearing Surface Containing a Rotating Cylinder (Metingen van de snelheidsverdeeling in de grenslaag aan een draagvlakmodel, waarin een draaiende rol is aangebracht), G. van der Heege Zijnen. Ingenieur, vol. 41, no. 43, Oct. 23, 1926, pp. 878–883, 8 figs. Details of experiments carried out at aerodynamic laboratory at Delft; measuring pressure distribution; velocity distribution with cylinder rotating and stationary, etc.

AIRSHIPS

Developments. Modern Airship Transport (Ueber die heutige Luftschiffahrt), A. Parseval. V.D.I. Zeit., vol. 71, no. 1, Jan. 1, 1927, pp. 20–22, 1 fig. In author's opinion, commercial airships are dependent upon use of hydrogen; for commercial purposes semi-rigid and, to greater extent, non-rigid ship is more advantageous than rigid airship, because it is cheaper, has greater carrying capacity and there is not such great danger of collapse; non-rigid ships are greatly improved by introduction of steel framework.

Hangars. See HANGARS.

Schütte-Lanz. Design of a Schütte-Lanz Airship for the U. S. Marine (Entwurf eines Schütte-Lanz-Verkehrsluftschiffes für die U. S. A.-Marine), G. Weiss. Schiffbau, vol. 27, no. 22, Nov. 17, 1926, pp. 652–654, 2 figs. Details of projects for helium content of 170,000 cu. m.; length, 282 m.; max. diam., 35.95 m.; engine output, 4000 hp.; max. speed, 134 km. per hr.; number of passengers, 132.

ALCOHOL

Methanol. See METHANOL.

ALLOY STEELS

Copper Steel. The Weather Resistance of Copper Steel Containing Copper (Die Witterungsbeständigkeit gekupferten Stahles), K. Daeves. Stahl u. Eisen, vol. 46, no. 52, Dec. 30, 1926, pp. 1857–1863, 11 figs. Points out agreement in results of all tests on superiority of steel with copper content; importance in agriculture; experiences with railways; American large-scale tests, and confirmation by German tests; superiority of basic steel; theory of protective action; field of application of copper steels.

Molybdenum Steel. Molybdenum Steel in Automobile Construction (Molybdänstahl im Kraftfahrzeugbau), W. Döhmer. Motorwagen, vol. 29, no. 35, Dec. 20, 1926, pp. 867–869. Influence of molybdenum steel consists mainly in heavy carbide formation exceeding that of tungsten; effective value of molybdenum in steels; of great importance for quality of molybdenum steel is production process; and as complete deoxidation of bath as possible.

ALLOYS

Acid-Resisting. Acid-Resisting Alloys with Nickel Basis (Säurefeste Legierungen mit Nickel als Basis), W. Rohn. Zeit. für Metallkunde, vol. 18, no. 12, Dec. 1926, pp. 387–396, 11 figs. Behavior of pure metals; chrome-alloys with additions of nickel, manganese, molybdenum and carbon; alloys with nickel as main constituent; mechanical properties of nickel-chrome and iron alloys; photographic results of corrosion tests.

Chemically Resistant Alloys and Their Properties (Chemisch beständige Legierungen und ihre Eigenschaften), E. H. Schulz and W. Jenge. Zeit. für Metallkunde, vol. 18, no. 12, Dec. 1926, pp. 377–386, 17 figs. Based on properties of number of pure metals, conclusions are drawn as to their adaptability as bases of acid and resisting alloys; deals specifically with silicon-iron and other alloy castings, malleable chrome and chrome-nickel steels, alloys of nickel and cobalt with chrome and rustproof coatings; chemical and strength properties, and behavior at higher temperatures. Bibliography.

Aluminum. See ALUMINUM ALLOYS.

Brass. See BRASS.

Copper. See COPPER ALLOYS.

Iron. See IRON ALLOYS.

Pouring Capacity. Effect of Chemical Composition of Alloys on Pouring Capacity, [Influence de la composition chimique des la iages suri l'aptitude à l'obtention de pièces moulées (ou coulabilité)], L. L. Guillet and A. Portevin. Académie des Sciences—Comptes Rendus, vol. 183, no. 16, Oct. 18, 1926, pp. 634–639. Authors distinguish between fluidity of alloy and its power of filling mold completely (flowability); latter has been determined at 550 and 450 deg. for alloys of tin with bismuth and with lead; "flowability" varies as continuous function of excess temperature of melt over that at which solidification starts; speed of solidification is specific property of alloy and must also be taken into account.

ALUMINUM ALLOYS

Aluminum-Beryllium. Improvement of Aluminum Alloys (Vergütbare Aluminumlegierungen), W. Kroll. Metall u. Erz, vol. 23, no. 22, 2nd Nov. issue, 1926, pp. 613–616. Substitution of beryllium for silicon; beryllium addition increases strength to small degree with metals of Lautal group; effect on duralumin is slight, but increase of strength with metals of Aludur type is considerable. See also succeeding article by same author, pp. 616–618, 1 fig., on mechanical properties of binary aluminum-beryllium alloys.

Aluminum Bronze. See ALUMINUM BRONZE.

Aluminum-Zinc-Tin. Corrosion and Physical Properties of Some Alloys of Aluminum, Zinc and Tin, N. O. Taylor. Am. Min. & Met. Engrs.—Trans., no. 1632-E, Jan. 1927, 11 pp., 7 figs. Investigation to ascertain whether presence of tin in varying quantities would have appreciable influence in controlling action of swelling in cast aluminum-zinc spiral pump rods used to circulate water in constant-temperature bath; large percentages of tin in alloys increased their ductility and resistance to shock.

Duralumin. See DURALUMIN.

ALUMINUM BRONZE

Quenching, Effect of. Transformation of Aluminum Bronzes (Sur les transformations subies par les bronzes d'aluminium), J. Bouldoires. Académie des Sciences—Comptes Rendus, vol. 183, no. 16, Oct. 18, 1926, pp. 660–661. Shows from experiments that velocity of cooling after annealing has great effect on resistance, maximum resistance occurring on quenching at 500 deg.

AUTOMOBILE ENGINES

Fuels. See AUTOMOTIVE FUELS.

Machining. How Production Methods Vary in Shops Building "Light Sixes," F. H. Colvin. Am. Mach., vol. 65, nos. 4, 5, 6, 7, 8, 9, 10, 11, 13, 15, 16, 20, 22 and 27, July 22, 29, Aug. 5, 12, 19, 26, Sept. 2, 9, 23, Oct. 7, 14, Nov. 11, 25 and Dec. 30, 1926, pp. 153–155, 199–202, 235–238, 273–274, 319–321, 363–364, 403–404, 449–450, 515–516, 599–600, 631–632, 785–786, 869 and 1053–1055, 82 figs. July 22: Cylinder blocks for Oakland Six. July 29: Tools and fixtures for Cleveland Six. Aug. 5: Operations on cylinder blocks and heads for Overland "Light Six." Aug. 12: Clamping and locating devices for cylinder heads; special milling heads and rotary tables. Aug. 19: Tools, fixtures and methods used in machining crankcases. Aug. 26: Fixtures for centering and holding crankcases; devices for insuring alignment when Cleveland parts go to assembly; Sept. 2: Tools and fixtures for making pistons for Oakland Light Six; boring and reaming pin holes. Sept. 9: Machining of flywheels for Willys-Knight and Overland engines at plant of Wilson Foundry and Machine Co., Pontiac, Mich. Sept. 23: Putting finishing touches on connecting rods. Oct. 7: Crankpin ends of Overland "Six" connecting rods broached without being bored; babbitting by centrifugal method. Oct. 14: Machining of transmission case of Cleveland car. Nov. 11: Methods used in holding awkward shaped piece for various machining operations in Cleveland plant; standard machines used. Nov. 25: Assembling operations of Overland Six engine. Dec. 30: Cleveland methods of assembly.

Manifolds. Manifolds in the Making, F. H. Colvin. Am. Mach., vol. 66, no. 1, Jan. 6, 1927, pp. 19–20, 6 figs. Two types of manifolds and how they are located and clamped for machining; cleaning insides by tumbling; milling operations require special fixtures.

Overhead Valve Gear. Overhead-Valve Gear. Autocar, vol. 57, no. 1623, Dec. 10, 1926, pp. 1094–1097, 10 figs. Problems to be faced in design of both push-rod operated and overhead-camshaft types.

Sleeve Valves. Sleeve Valve Design, P. Cormach. Automobile Engr., vol. 16, no. 223, Dec. 1926, pp. 496–498, 5 figs. Diagrammatic method of determining port openings.

Torque Converter as Part of. Constantinesco Torque Converter Built as Part of Engine. Automotive Industries, vol. 56, no. 3, Jan. 22, 1927, pp. 76–78, 5 figs. Automatic transmission incorporated in power plant, which has two cylinders, each practically forming separate engine; important feature of device is over-running clutch.

AUTOMOBILE MANUFACTURING PLANTS

England. The Works of John I. Thornycroft & Co., Ltd. Automobile Engr., vol. 16, no. 223, Dec. 1926, pp. 480–485, 8 figs. Methods and equipment; upward of 6 different types of commercial vehicle chassis are produced with 5 distinct types of engine and power unit, in addition to vehicles of tractor type, of which "Q" tractor and Hathi tractor are best-known examples.

Production Methods. How Production Methods Vary in Shops Building "Light Sixes," F. H. Colvin. Am. Mach., vol. 66, no. 2, Jan. 13, 1927, pp. 49–51, 6 figs. Lining up steering knuckles; fixtures for frame and spring assembly; machine for running in brake bands and setting bands by dummy brake drum.

AUTOMOBILES

Brakes. Braking of Automobiles (Bremeswege von Kraftfahrzeugen), E. Essers. Automobil-Rundschau, vol. 28, nos. 16 and 17, Nov. 3, and Dec. 1, 1926, pp. 373–376, and 403–406, 9 figs. Calculation of shortest braking distance by means of nomogram; effect of rolling and sliding friction.

Elcar. Elcar Has New Eight-in-Line, A. H. Packer. Automotive Industries, vol. 55, no. 25, Dec. 16, 1926, p. 1001, 1 fig. Introduces model 8-82 in three body styles; engine is Lycoming; body felt-insulated.

German Show. The German Motor-Car and Motor-Cycle Exhibition 1926, Heller. Eng. Progress, vol. 7, no. 12, Dec. 1926, pp. 323–326, 10 figs. New 6-cylinder engines; Horch 8-cylinder engine; high-speed Diesel engines; change gears with automatic change over; 4-wheel brakes; front-wheel drive; rear-axle drive for buses with low-lying frames.

Mannesmann. The Mannesmann Automobile (Der 5/20 PS Personenwagen der Mannesmann-Motorenwerke), Engel. Motorwagen, vol. 29, nos. 29 and 33, Oct. 20 and Nov. 30, 1926, pp. 699–703, and 821–828, 19 figs. Details of sport car which took part in 1926 Eifel Race; 4-cylinder engine has high brake efficiency.

Rate Fixing and Estimating. Rate-Fixing and Estimating. Automobile Engr., vol. 16, nos. 211, 212, 213, 214, 215, 216, 218, 219, 220, 222 and 223, Jan., Feb., Mar., Apr., May, June, Aug., Sept., Oct., Nov. and Dec. 1926, pp. 31, 62, 97–98, 141, 184, 310, 348, 378, 455–456 and 493. Practical basis for fixing prices in all classes of automobile work. Mar.: Foundry rate fixing; fixing cores; loam molding; coremaking. Apr.: Rate fixer's work in machine shop. May: Chart for cutting speeds and corresponding spindle speeds. June: Calculation of exact cutting times with plain turning and boring operations. Aug.: Fixing times in all classes of automobile work; Sept.: Milling machines; speeds and feeds; calculating cutting times. Oct.: Screwing speeds, setting up, etc. Nov.: Gear cutting, grinding. Dec.: Practical basis for fixing times in all classes of automobile work.

AUTOMOTIVE FUELS

Airplane-Engine. Aero Engine Fuels of Today and Tomorrow. Royal Aeronautical Soc.—Jl., vol. 30, no. 192, Dec. 1926, pp. 696–730 and (discussion) 731–742, 16 figs. Sources of supply; oil shale; coal by-products; power alcohol; general characteristics of gasoline and other light fuels; casing-head gasoline; cracked gasoline; straight-run gasoline; benzol and naphthalene; low-temperature carbonization; hydrogenation according to Bergius process; alcohol; dopes; detonation, etc.

Alcohol. Engine Drive with Alcohol Fuels (Betrieb von Motoren mit Spiritusbrennstoffen), E. Hubendick. Automobil-Rendschau, vol. 28, nos. 13 and 14, Oct. 1 and 28, 1926, pp. 299–302 and 318–322, 20 figs. Discusses mixtures of alcohol, water, benzol and benzine; and gasoline engine burning this fuel; fuel-air mixtures; fuels containing 25 per cent alcohol, and 50 to 100 per cent alcohol; adjustment of engine.

Gasin. Gasin, a New Motor Fuel (Uber den neuen Kraftstoff "Gasin"), G. Grote. Petroleum Z., vol. 22, no. 31, Nov. 1, 1926, pp. 1182–1183. Also translation in Nat. Petroleum News, vol. 18, no. 52, Dec. 29, 1926, pp. 21–22. By comprehensive experiments, it was established by inventors of gasin that all of different knocks have one and same cause, and only because of varying length of sound waves, make themselves audible as different sounds; all of these occurrences are grouped together under expression "detonation knocks" causes of which are given; results of tests of gasin show that it does not knock, and therefore gives higher power from lower fuel consumption than other fuels.

Gasoline. See GASOLINE.

Methanol. See METHANOL.

AVIATION

Accidents. On Flying Accidents. Aeroplane, vol. 31, no. 22, Dec. 1, 1926, pp. 669–674, 2 figs. Statistics of accidents; chance and certainty; causes of accidents and remedies; unpreventable accidents.

Civil Air Regulations. The Department of Commerce Issues Final Civil Air Regulations. Aviation, vol. 22, no. 1, Jan. 3, 1927, pp. 32, 34–36 and 38, 4 figs. Résumé of regulations which are to govern civil air activities.

Night Transportation. German Night Air Transportation, E. Milch. Aviation, vol. 22, no. 2, Jan. 10, 1927, pp. 76–77, 3 figs. Berlin-Koenigsberg night airway fully lighted; 3-engine planes used; details of night-flying instruments; terminal lighting.

AXLES

Car, Reclaiming. Reclaiming Scrap Car Axles. Forging—Stamping—Heat Treating, vol. 13, no. 1, Jan. 1927, pp. 24–25, 2 figs. Best practices in reclaiming processes consist of (1) disposing of old end collars by drawing down on steam hammer or turning off in lathe; (2) lengthening axle between journals so that worn fillets will clean up when machined, either by drawing out under hammer or swaging in bulldozer or upsetting forging machine; (3) forming new end collars and shortening overall length to that of next smaller size axle in either upsetting forging machine or bulldozer.

B

BAGASSE

Calorific Value. Bagasse as Fuel, R. F. Hutcheson. Int. Sugar Jl., vol. 28, no. 336, Dec. 1926, pp. 652–658. Calorific value per lb. of bagasse; heat required to produce combustion; air required to burn 1 lb. of bagasse; it is shown that bagasse from 50 tons of cane is capable of developing 2266 b.hp.

BEARINGS

Automobile. The Production of Motor-Car Bearings. Machy. (Lond.), vol. 29, no. 738, Dec. 2, 1926, pp. 257–262, 18 figs. Methods used by Glacier Metal Co., Alperton, Middlesex, Eng.; production of anti-friction metal of its own proprietary compositions and manufacture of plain bearings and bushes for large number of motor car, motorcycle, railway, electrical and other machinery.

BEARINGS, BALL

Traction Motors. Ball and Roller Bearings for Traction Motors. Machy. (Lond.), vol. 29, no. 742,

Dec. 30, 1926, pp. 419–423, 10 figs. Types of bearings used; advantages of anti-friction bearings; typical designs and applications; lubrication and protection.

BLOWERS

Turbo. Turbo-Blowers for Pneumatic Conveyors, A. Baumann. Brown Boveri Rev., vol. 13, no. 12, Dec. 1926, pp. 289–292, 4 figs. Comparison of turbo and reciprocating blowers; use of special regulating devices.

BOILER FEEDWATER

Disencrustants. Boiler Disencrustants, A. Seton. Eng. & Boiler House Rev., vol. 40, no. 7, Jan. 1927, pp. 364–365. Deals with softening of water in boiler whereby formation of scale is prevented to some extent and discusses disencrustants of different makes.

Heating. Practice in Feed Water Heating. Power Plant Eng., vol. 31, no. 1, Jan. 1, 1927, pp. 28–29, 2 figs. Regenerative cycle is being used in most of modern stations.

Oil Removal from. Complete Removal of Oil from Boiler Feedwater (Het volkomen olie-vrij maken van het voedingwater), J. C. Dijxhoorn. Het Schip, vol. 8, no. 23, Nov. 12, 1926, pp. 332–333, 1 fig. Application of Dijxhoorn system of oil separators; as example 1 kg. sodium salt and 3 kg. alum are used to heat 24 tons feedwater.

Preparation. Feed Water Preparation. Power Plant Eng., vol. 31, no. 2, Jan. 15, 1927, pp. 119–129, 14 figs. Feedwater heater; water and steam purification; present status of economizer practice.

Specifications. Principles of Modern Specifications for Boiler Feedwater (Neuzeitliche Beurteilungsgrundsätze für Kesselspeisewasser), A. Splittgerber. Zeit. für angewandte Chemie, vol. 39, no. 44, Nov. 4, 1926, pp. 1340–1345. Necessity of careful analytical control of boiler feedwater, before and after softening, for efficient and economical running, is emphasized, and methods of softening described.

Treatment. Feed Water Treatment in Power Plants. Power Plant Eng., vol. 31, no. 1, Jan. 1, 1927, pp. 25–28, 2 figs. Higher steam pressures and demand for higher ratings have made feedwater treatment problem of vital importance.

Recent Developments in Feed-Water Treatment, E. H. Tenney. Power Plant Eng., vol. 31, no. 1, Jan. 1, 1927, pp. 23–24, 2 figs. Practice in chemical methods of treatment, evaporation, deaeration, and stage feedwater heating.

BOILER FURNACES

Air Preheaters. The Effect of Water-Cooled Walls on Preheater Performance, N. E. Funk. Mech. Eng., vol. 49, no. 1, Jan. 1927, pp. 25–28, 10 figs. Paper presenting data supplementing those given by author in previous one comparing performance of several types of air preheaters.

Draft Practice. Forced, Induced and Natural Draft Practice. Power Plant Eng., vol. 31, no. 1, Jan. 1, 1927, pp. 20–22, 1 fig. Developments in draft equipment have been in direction of more effective application rather than improvement in design of equipment.

Heat Balance. Research on Calculation of Heat Balance and Use of Graphic Methods (Recherches relatives au calcul des bilans thermiques et application des méthodes graphiques). Chaleur & Industries, vol. 7, no. 78, Oct. 1926, pp. 566–571, 7 figs. Graphic calculation of heat balance of gas producers, fire-tube boilers, heating boilers, etc.; develops charts for purpose and gives examples of calculation.

Incomplete Combustion. Determination of Losses through Incomplete Combustion in Boiler Furnaces (Zur Bestimmung der Verluste durch unvollkommene Verbrennung in Dampfkesselfeuerungen), E. Abolin. Archiv für Wärmewirtschaft, vol. 7, no. 12, Dec. 1926, pp. 345–348, 3 figs. Derivation of combustion equations; determination of losses by means of Ostwald-Seufert triangle diagram for combustion and an improved triangle; points out inadequacy of all exhaust-gas diagrams.

Turbine. New "Turbine" Furnace Developments. Eng. & Boiler House Rev., vol. 40, no. 7, Jan. 1927, p. 362, 1 fig. New addition to standard "Turbine" steam-jet forced-draft furnace design for steam, boiler and general furnace work; it is combined furnace extension for cleaning out, and ingenious smoke-preventing large baffle bridge with flue-gas passages between, built up of interchangeable firebrick blocks of novel design.

Wood-Refuse Burning. Mechanical Handling and Firing of Wood Refuse, W. H. Rohr. Wood-Worker, vol. 45, no. 11, Jan. 1927, pp. 34–36, 4 figs. Modern installation of equipment for handling and firing wood refuse, which is giving excellent results.

BOILER OPERATION

Efficiency. Advanced Boiler Practice, E. F. Miller. Tech. Eng. News, vol. 7, no. 6, Dec. 1926, pp. 259, 296 and 298. Summary of methods of obtaining highest efficiencies from boiler installations.

BOILER PLANTS

Automatic. Boiler Plant Runs Automatically at Masurel Worsted Mills, C. J. Auclair. Power, vol. 64, no. 26, Dec. 28, 1926, pp. 975–978, 2 figs. Oil burners are switched on and off by steam pressure; feedwater system is equipped to operate without manual control; plant is equipped with feedwater meters, oil meters, recording pressure gages and flue-gas pyrometer; steam is generated at total cost of 65 cents per 1000 lbs.

Convection-Heat Utilization. Modern Apparatus for Utilizing Convection Heat in the Boiler House. Eng. & Boiler House Rev., vol. 40, no. 6, Dec. 1926, pp. 271–283, 15 figs. Review of apparatus designed to utilize heat of combustion other than radiant heat of furnace; deals with coal drying, air preheating, superheaters and steam reheaters and economizers.

Equipment. Steam Generating Equipment. Power Plant Eng., vol. 31, no. 2, Jan. 15, 1927, pp. 130–137, 13 figs. Developments in boiler construction; recent superheater developments.

Factories. The Steam Generating Plant of a Modern Factory, R. E. Light. Eng. & Boiler House Rev., vol. 40, no. 6, Dec. 1926, pp. 284–292, 6 figs. and no. 7, Jan. 1927, pp. 333–336, 5 figs. Boiler-house installations and operating procedure at Bristol and Somerdale factories, J. S. Fry & Sons. Steam and feed systems; make-up feedwater; routine and maintenance.

Instruments. Measuring Instruments for Steam Plants (Messinstrumente im Dampfbetried und deren Bedeutung für eine wirtschaftliche Betriebsführung), U. Philipp. Wärme, vol. 49, no. 48, Nov. 26, 1926, pp. 837–839, 4 figs. Practical recommendations for use of instruments; reliability is essential and it must be easy to use instruments and interpret results. See brief translated abstract in Eng. & Boiler House Rev., vol. 40, no. 7, Jan. 1927, pp. 366 and 373.

BOILERS

Auxiliary Heaters. Auxiliary Heater Increases Capacity of Existing Boilers, S. Bolitz. Power, vol. 65, no. 3, Jan. 18, 1927, pp. 98–99, 2 figs. Novel device designed to increase steam-raising capacity of existing boilers, patented by Russian engineer, W. Perlowsky; results obtained with this device in series of tests performed at Technische Hochschule, Charlottenburg, Germany, and its successful operation in practical service; device is auxiliary water-tube evaporating heater, or evaporator, best described as extension to boiler heating surface similar to economizer, except that it is added to hot end of boiler instead of cold.

Corrosion. The Origin and Prevention of Corrosion in Boilers (Die Entstehung und die Verhütung von Korrosionen in Dampfkesseln), P. Wiegleb. Brennstoff u. Wärmewirtschaft, vol. 8, no. 22, Dec. 1, 1926, pp. 369–373, 2 figs. Discusses four causes of corrosion by feedwater, namely: gases dissolved in water, insoluble and soluble materials and volatile acids.

Developments. Developments in Boilers and Boiler Auxiliaries. Power, vol. 65, no. 1, Jan. 4, 1927, pp. 9–13, 7 figs. Increasing use is being made of radiant surface in steam boilers with water-cooled furnace walls; air preheating is gaining favor; for time being, high pressures have ascendancy over high temperatures; developments in industrial plants show trend toward pressures and temperature comparable with central-station practice.

High-Pressure. Boiler Pressures Continue to Increase. Power Plant Eng., vol. 31, no. 1, Jan. 1, 1927, pp. 35–37, 2 figs. Higher pressures and ratings bring out new designs and problems; reheat and water-screen boilers used in new stations.

Swiss Boiler Generates 1500-lb. Steam Pressure in Two Stages. Power, vol. 65, no. 5, Feb. 1, 1927, pp. 160–162, 2 figs. Steam from low-pressure section (200-lb. pressure) preheats feedwater to high-pressure section; this arrangement reduces size of high-pressure boiler and gives it a supply of distilled feedwater.

Improvements. Boilers and Superheaters Show Improvements, A. D. Bailey. Power Plant Eng., vol. 31, no. 1, Jan. 1, 1927, pp. 33–34, 3 figs. Higher pressures and temperatures, larger boilers, higher ratings, reheat boilers, water walls and improved appurtenances combine to make progress in this field notable.

Increasing Efficiency. An Example of Improved Boiler Efficiency, M. Ehrlich. Power, vol. 65, no. 4, Jan. 25, 1927, p. 121. Increase in efficiency was brought about by raising boiler 2 ft. 7 in., changing baffling from horizontal to vertical, and introducing high-temperature insulator in setting; tests show improved performance.

Locomotive. See LOCOMOTIVE BOILERS.

Low-Grade Fuels for. Preparation of Low-Grade Fuel for Coal-Mine Boilers (Die Kesselanlage auf der Schachtanlage 2/6/9 der Zeche Graf Bismarck), M. Schimpf. Glückauf, vol. 62, no. 44, Oct. 30, 1926, pp. 1444–1450, 6 figs. Special equipment has been laid down at Graf Bismarck coal mines at Gelsenkirchen to deal with wet, high-ash coal for use in new range of inclined water-tube boilers serving central compressed-air and power plant; it was decided to store middle product from washery in draining towers and to pass into latter slimes from settling tanks; middle product thus acts as filter bed for slimes which are mixed intimately with former; details of six Piedboeuf water-tube boilers with Nyeboe & Nissen forced-draught, traveling grates and typical data from steam trial. See brief abstract in Colliery Eng., vol. 3, no. 34, Dec. 1926, p. 549.

Rivet Seams. Calculation and Spacing of Riveted Joints in Boilers (Die Berechnung und Einteilung der Nietnähte von Dampfkesseln), E. Höhn. Zeit. des Bayerischen Revision-Vereins, vol. 30, nos. 21 and 22, Nov. 15 and 30, 1926, pp. 255–258 and 267–271, 16 figs. Discusses conditions a joint must fulfil; calculation of longitudinal joints with three rows of rivets and straps of equal and unequal width; stresses in plates; calculation of straps; bending stresses.

Scale Prevention. Scale Prevention on Fire Tube Boilers. Universal Engr., vol. 44, no. 6, Dec. 1926, pp. 25–26, 1 fig. Survey of heavy scale formation in boilers of Monmouth Memorial Hospital, Long Branch, N. J., resulting in installation in 1923 of De-Concentrator supplied by Hagan Corp.; deconcentrator has entirely prevented formation of scale, sediment remaining in boiler being soft and readily washed out, and small in amount as compared with former quantity of scale.

Settings, Insulation of. Insulation of Boiler Settings (Isolierung der Dampfkesseleinmauerung), Schulte. Archiv für Wärmewirtschaft, vol. 7, no. 12, Dec. 1926, pp. 351–354. Advantages of insulation for intermittent operation; costs of insulation for different types of boiler; heat savings effected and othe economies.

Sulzer. The Sulzer 1500 lb. Boiler. Engineer, vol. 142, no. 3703, Dec. 31, 1926, pp. 706–709, 9 figs. Particulars of boiler plant in Sulzer works at Winterthur, Switzerland; it has working pressure of 110 atmos. with total steam temperature of 707 deg. fahr.; primary object of construction was to acquire experience in generation and use of steam at extra high pressures.

Theory. Theory of Steam Boiler (De theorie van den stoomketel), F. Van Iterson. Ingenieur, vol. 41, no. 37, Sept. 11, 1926, pp. 757–761, 4 figs. Heat transmission from air in motion to tubes and nests of tubes in counter current; develops formulas for coefficient of heat transmission; evaporation tests with various types of boilers.

Waste-Heat. Calculation of Heat Distribution in Kilns, Waste-Heat Boilers and Flues, R. R. Coghlan and T. H. Arnold. Concrete (Mill Section), vol. 30, no. 1, Jan. 1927, pp. 104–108, 1 fig. Method of checking operating results from waste-heat boilers and kilns; charts, tables and formulas to facilitate computations; calculating air required for combustion; raw-material gases and their analysis; heat absorption; heat calculation; comparison with direct-fired boilers.

BOILERS, WATER-TUBE

Collins. Collins Water Tube Boiler, L. R. Hemingway. West. Machy. World, vol. 17, no. 12, Dec. 1926, pp. 540–542, 5 figs. Boiler combines advantageous features of both straight-tube and bent-tube types, while also eliminating undesirable points of each.

BOLTS

Round Unslotted-Head. Tentative American Standards for Round Unslotted-Head Bolts. Mech. Eng., vol. 49, no. 1, Jan. 1927, pp. 59–61, 6 figs.

BRASS

Addition Material for. An "Addition Material" for Brass. Metal Industry (Lond.), vol. 29, no. 25, Dec. 17, 1926, p. 582. Material, having trade name of Raffinat, introduced by G. Hirschland, Düsseldorf, Germany, for use in brass and gunmetal foundries; it combats difficulties attending use of scrap metals containing impurities, thus insuring production of perfect castings, even from scrap and swarf of inferior quality.

BRASS FOUNDRIES

Practice. "Non-Ferrous Foundry Practice," A. Logan. Foundry Trade Jl., vol. 34, nos. 538 and 539, Dec. 9 and 16, 1926, pp. 505–507 and 526–528, 7 figs. Deals mainly with metallurgical considerations of brass founding; solidification of non-ferrous alloys; method of making alloy. Dec. 16: Casting temperature, manganese brass, aluminum bronzes; general considerations of non-ferrous work.

The Fundamentals of Brass Foundry Practice, R. R. Clarke. Metal Industry (N. Y.), vol. 24, nos. 7, 8, 9, 10 and 11, July, Aug., Sept., Oct. and Nov. 1926, pp. 283–284, 318–320, 365–366, 417–418 and 453–454, 18 figs. Basic laws controlling melting and casting of metals and their application to foundry operations.

Pyrometer Control. Temperature Determination in the Non-Ferrous Foundry. Metal Industry (Lond.), vol. 29, nos. 14 and 15, Oct. 1 and 8, 1926, pp. 309–313 and 338–339. Abstract of four papers presented before American Foundrymen's Assn., as follows: Oct. 1: Pyrometer Control in Brass Foundry, A. S. Hall; Use of Pyrometers in Casting of Non-Ferrous Metals, R. D. Bean; Thermo-Couple for Ladle Temperatures of Brass, A. A. Grubb, L. H. Marshall and C. V. Nass; Oct. 8: Visual Judgment of Non-Ferrous Metal Temperatures, R. R. Clarke.

C

CABLEWAYS

Asbestos Transport. The Aerial Ropeway Erected in Cyprus for the Transport of Asbestos. Quarry and Surveyors' and Contractors' Jl., vol. 31, no. 358, Dec. 1926, pp. 402–404, 6 figs. Ropeway is of three-cable type with continuous working order.

Four-Vehicle Railway. A Novel Austrian Electrically Operated Cable Tramway, C. J. Webb. Eng. & Min. Jl., vol. 122, no. 26, Dec. 25, 1926, p. 1018, 1 fig. Novel form of cable railroad has been completed in Erzberg, Austria, novelty lying in fact that whereas usually only one ascending and descending car is employed in this case there are two ascending and two descending vehicles; line has total length of 0.83 mile; winding gear is of type known as Ohne Sorge and is electrically operated.

CAMS

Design. Cam Design and Valve Motion with Special Regard to Internal-Combustion Engines (Nockenform und Ventilbewegung mit besonderer Berücksichtigung der Verbrennungsmotoren), M. Ringwald. V.D.I. Zeit., vol. 71, no. 2, Jan. 8, 1927, pp. 47–52, 12 figs. Laws of movement for most common types of cams are presented and factors underlying design are developed. Bibliography.

Screw-Machine. Model for Designing Screw Machine Cams, H. Simon. Machy. (Lond.), vol. 29, no. 739, Dec. 9, 1926, pp. 297–302, 12 figs. Diagram model which solves problems of turret-tool clearance, turret-tool head and machine-bed clearance, interference of turret-tool stems, cut down on cam lobes, adjustment of turret slide, limits of turret- and cross-tool locations, interference of turret tools with product, etc.

CARS

Draft Gears. The Operation and Testing of Draft

Gears, A. F. Stuebing. Ry. Mech. Engr., vol. 101, no. 1, Jan. 1927, pp. 19–23. Methods used in testing and their importance in draft-gear design.

CARS, COAL

Three-Hopper. Lackawanna Installs 70-Ton Three-Hopper Steel Cars. Ry. Mech. Engr., vol. 101, no. 1, Jan. 1927, pp. 33–35, 5 figs. Many parts standardized and interchangeable; loading increased by locating stakes inside.

70-Ton Hopper Cars for D. L. & W. Ry. Age, vol. 81, no. 26, Dec. 25, 1926, pp. 1273–1274, 2 figs. Three-hopper steel cars built to replace 40-ton steel and wood-carrying equipment; loading capacity increased by locating stakes inside of car body. See also Ry. Rev., vol. 79, no. 26, Dec. 25, 1926, pp. 931–933, 5 figs.

CARS, PASSENGER

Lacquer Finishes. Lacquer Finishes as Applied to Passenger Cars and Locomotives, R. M. Cook. South. & Southwestern Ry. Club., vol. 18, no. 12, Nov. 1926, pp. 34–61. Consideration of use of pyroxylin on passenger cars.

Sleepers. Sleeping Cars for the International Sleeping Car Company, Limited. Engineering, vol. 122, nos. 3179 and 3180, Dec. 17 and 24, 1926, pp. 751–752 and 785–786, 38 figs., partly on p. 758 and supp. plate. Cars form part of "Blue Train," constructed by Birmingham Railway Carriage & Wagon Co.; body is entirely of steel plate, reinforced vertically by pressed steel pillars and horizontally by rolled-steel sections at cant rail, waist and bottom rail.

CASE-HARDENING

Nitrogen. Nitrogen Case-Hardening Process Brought to This Country. Automotive Industries, vol. 55, no. 25, Dec. 16, 1926, p. 1013. System of producing hard case on steel parts by causing diffusion of nitrogen into surface layer of steel.

CAST IRON

Corsalli Direct-Production Process. The Iron-founder and Direct Iron Production, C. Gilles. Foundry Trade Jl., vol. 34, no. 541, Dec. 30, 1926, pp. 563–566, 2 figs. Deals with Corsalli process, whereby low-carbon iron (especially iron and steel scrap) should be melted, added iron alloys being protected at same time by briquetting and encrusting them; casting properties of Corsalli iron; direct process. Paper read before German Foundrymens' Soc.

Electric Alloy. Electric Iron has Close Grain. Foundry, vol. 54, no. 22, Nov. 15, 1926, pp. 909–910, 4 figs. Alloy metal made in electric furnace has dense pearlitic structure and may be machined readily at high Brinell hardness; applications diversified; results of experiments for past two years by Vulcan Mold & Iron Co., Latrobe, Pa.

Problems. A Sceptic in the Iron Foundry, A. Allison. Foundry Trade Jl., vol. 34, no. 541, Dec. 30, 1926, pp. 567–568, 1 fig. Rules for pig iron; what happens at foundry; quality of cast iron turns largely upon total carbon content and its condition; points out that cast iron calls for much greater care in control if higher quality could be obtained.

CASTING

Alloy. Contraction in Alloy Casting, H. C. Dews. Foundry Trade Jl., vol. 34, no. 540, Dec. 23, 1926, pp. 541–544, 7 figs. Discusses ways in which soundness of casting is related to volume changes brought about by change of temperature; deals with liquid, solid and pasty state of metals; what happens when alloys freeze; location of contraction cavity; equal section not desirable; alloys with freezing ranges.

Centrifugal. Centrifugal Casting of Steel, L. Cammen. Soc. for Steel Treating—Preprint, no. 4, for mtg. Jan. 20–21, 1927, 35 pp., 11 figs. Deals with centrifugal tube casting and shows its present and prospective field of application and limitations, particularly where it comes into competition with piercing process; describes new art of centrifugal bar casting, affecting entire steel industry; its importance lies in its ability to produce metal of better quality at cost estimated to be from $3.50 to $8.50 per ton lower than present methods; explains mechanical and metallurgical features of process and machinery employed.

CASTINGS

Defective, Reclamation of. The Reclamation of Defective Castings, C. W. Brett. Metal Industry (Lond.), vol. 29, no. 24, Dec. 10, 1926, pp. 561–562, 2 figs. Claims that it is now possible, on average basis, to reclaim at least 50 per cent of ordinary foundry scrap heap, and rapidly and economically restore it to full efficiency by one or other of half-dozen welding processes regularly employed; practical application of scientific methods; detection of welding imperfections.

CENTRAL STATIONS

B.T.U. per Kw-Hr. Sold. 21,400 B.t.u. Per Kilowatt-Hour Sold. Elec. World, vol. 89, no. 2, Jan. 8, 1927, pp. 93–96, 2 figs. Comparison of system B.t.u. per kilowatt-hour generated and sold; 50 to 70 per cent poorer economy is shown by systems having less than 40,000-kw. rating.

Design. Modern Power Plant Trends. Power Plant Eng., vol. 31, no. 1, Jan. 1, 1927, pp. 2–7, 9 figs. Effort to achieve greatest heat economy and heat adaptation to conditions is evident; developments in boilers, superheaters, stokers, economizers and air pre-heating, draft practice, feedwater systems, condensers, generators, electrical switching and transformation and steam turbines.

Detroit, Mich. Eighteen Months' Experience at Trenton Channel Station, A. Dow. Power, vol. 65, no. 2, Jan. 11, 1927, pp. 46–48, 1 fig. Results of 2 years' experience; single-cylinder turbine makes good use of steam up to about 400 lb. pressure; d.c. auxiliary system; pulverized fuel.

Experience with Trenton Channel, A. Dow. Elec. World, vol. 89, no. 2, Jan. 8, 1927, pp. 91–92. Thermal efficiency and operating costs during 18 months better then calculated; reason for steam pressure; d.c. auxiliaries favored; well satisfied with powdered fuel.

Illinois. Grand Tower Power Station, J. D. Roberts. Elec. Light & Power, vol. 5, no. 1, Jan. 1927, pp. 23–26 and 80, 10 figs. Station takes its name from small town near which it is located; situated on east bank of Mississippi River; contains two 25,000-kw. single-cylinder, steam-driven turbo-generators with direct connected exciters; turbines are operated with steam at pressure of 375 lb. gage, and temperature of 726 deg. fahr.; steam is extracted at two points for heating condensate to temperature of about 200 deg. before it is returned to boiler-feed pumps.

Parr Shoals, S. C. Features of Parr Shoals Steam Power Plant, R. D. Stauffer. Power Plant Eng., vol. 31, no. 3, Feb. 1, 1927, pp. 172–180, 10 figs. South Carolina generating station, designed for ultimate capacity of 80,000 kw., burns pulverized coal; its present rated capacity is 42,500 kw., supplied by two Westinghouse turbo-generators of 12,500 and 30,000 kw. capacity, respectively, utilizing steam at 315 lb. pressure at 675 deg. fahr., and generating 60-cycle, 3-phase current at 13,200 volts, which is raised by "Y" connected transformers to transmission-line potential of 110,000 volts.

CHROME STEEL

Engine Exhaust Valves. Chrome Steels and Cobalt Steels (Sur les aciers au chrome et au cobalt), F. M. Ostroga. Académie des Sciences—Comptes Rendus, vol. 193, no. 20, Nov. 15, 1926, pp. 882–885. Expansion and microstructure of chrome and cobalt steels used for exhaust valves in certain engines; facility of super-tempering them in air after heating to comparatively low temperature, etc.

COAL

Briquetting. Briquet Binder Containing Residues from Alcohol Manufacture, W. C. Moore and H. A. Myers. Indus. & Eng. Chem., vol. 19, no. 1, Jan. 1927, pp. 147–149. Presents series of formulas for use of evaporated molasses residue as constituent of binder for making briquets from anthracite; in general, such briquet must be baked to at least 600 deg. fahr. for not less than 30 minutes; combination of evaporated molasses residue, asphalt, sodium carbonate, calcium chloride and sulphur makes excellent binder for anthracite coal briquets.

Distillation. The Bussey Process of Low-Temperature Distillation, R. B. Parker. Mech. Eng., vol. 49, no. 1, Jan. 1927, p. 20. Process consists of maintaining combustion of mixture of air and gas in lower end of vertical column of coal, which is confined within air-tight, brick-lined stack, and in removing consequent products of combustion together with evolved gases from top of stack by drawing or forcing them through superimposed mass of coal; devolatilized carbon residue is removed from base of stack as formed, and fresh raw material in equal volume added to top of column as charge settles due to action of gravity. (Abstract.) Paper read before Int. Conference on Bituminous Coal, Pittsburgh.

The McEwen-Runge System for the Low Temperature Distillation of Coal, W. Runge. Can. Min. Jl., vol. 47, nos. 48 and 50, Nov. 26 and Dec. 10, 1926, pp. 1131–1134 and 1170–1171. McEwen's early work; results of first practical application and experiemtal plant; Milwaukee development unit and plant; operation of carbonizing unit; estimated heat required for carbonizing; quality of gas from process; semi-coke.

Sampling. Automatic Coal Sampler at Springdale Station, T. Thorsten. Power, vol. 64, no. 26, Dec. 28, 1926, p. 974, 1 fig. Consists of tube provided with opening in one side of sufficient length to take in full depth of coal stream and of sufficient width to receive largest pieces of coal; when sampler is at point of exposing its opening to coal stream, quick revolving movement is imparted to it, exposing opening for short interval and obtaining sample corresponding to speed of falling coal and time opening is exposed; sample obtained is conveyed through hollow tube to crusher.

Utilization. Recent Developments in the Science of Coal Utilization, C. H. Lander. Mech. Eng., vol. 49, no. 1, Jan. 1927, pp. 1–11, 17 figs. Constitution of coal; analysis; preparation for market; low-temperature carbonization; low-temperature coke and tar; metallurgical coke; production of free-burning coke by high-temperature methods; pulverized coal and structure of cenospheres; production of oil from coal by methods other than carbonization. Robert Henry Thurston lecture on Relation Between Engineering and Science.

COAL HANDLING

Gas Works. Gas Works Coal-Handling Plant. Engineering, vol. 122, no. 3180, Dec. 24, 1926, pp. 779–781, 13 figs. partly on p. 788. Details of unloading transporter, cableway conveyor, protection bridges loading stations and telpher transporter; cableway is of double-rope type.

COMPRESSED AIR

Packings for Lines. Packings for Compressed-Air Lines (Untersuchungen an Dichtungen für Pressluftleitungen), P. Wilson. Glückauf, vol. 62, no. 41, Oct. 9, 1926, pp. 1357–1358, 1 fig. Points out there is room for improvement in mines by concentrating workings so as to reduce length of pipe lines and by reducing leakage from latter; particulars of tests made by Gersdorf Steinkohlenbau Verein with view to testing efficacy of different packings for air lines. See brief translated abstract in Colliery Eng., vol. 3, no. 34, Dec. 1926, p. 549.

Practice, Waste Elimination in. Improvements in Compressed-Air Practice (Neuerungen in der Pressluftwirtschaft), J. Blitek. Zeit. des Oberschlesischen Berg u. Hüttenmännischen Vereins, vol. 65, no. 5, May 1926, pp. 310–312, 2 figs. Due to leaky joints, idle running of machines, or unauthorized use of compressed air to ventilate workings, it often happens that consumption of compressed air is excessive in districts near compressors, with result that pressure is low in remaining districts; author recommends insertion, at commencement of each branch pipe of diaphragm, diameter suited to legitimate air consumption of district served; whatever difference in pressure between two sides of diaphragm, aperture prevents air flow from exceeding definite limit; use of diaphragms helps materially in locating faults.

CONDENSERS, STEAM

Counter-Current Jet. Counter-Current Jet Condenser (Ein neuer Gegenstrom-Misch-Kondensator), B. Müller. Petroleum, vol. 22, no. 30, Oct. 20, 1926, pp. 1140–1142, 3 figs. Condensers (Borrmann system) consist of scrubbing tower fitted with layers of irregularly packed material supported on perforated plates; improvement consists in perforations which are formed into jets projecting alternately upward and downward, thus separating flow of vapors and steam upward from flow of water downward.

Development. Progress in Condenser Design. Power Plant Eng., vol. 31, no. 2, Jan. 15, 1927, pp. 143–146, 5 figs. Statements by various manufacturers.

Improvements. Condenser Practice Trends Well Defined, H. W. Leitch. Power Plant Eng., vol. 31, no. 1, Jan. 1, 1927, pp. 47–48, 1 fig. Steam extraction and increased size of units further complicate condenser selection while improved designs and auxiliaries give better performance with possibility of further gains.

Single-Pass. Condenser Improvements Benefit Entire Station. Power Plant Eng., vol. 31, no. 1, Jan. 1, 1927, pp. 49–53, 3 figs. Single-pass, divided water box, improved steam distribution, deaerating hotwells, introduction of boiler makeup and improved cleaning methods, assist in improved station efficiencies.

Tubes. Cleaning Condenser Tubes. Power, vol. 65, no. 2, Jan. 11, 1927, p. 64. Laboratory experiments by Elliot Co. indicate that proper acid concentration to use in removing condenser-tube scale is 2.5 per cent solution by volume of hydrochloric acid for treatment of one hour's duration.

Heat Transfer Through Wet Condenser Tubes, R. H. Andrews. Power, vol. 64, no. 26, Dec. 28, 1926, pp. 981–982, 3 figs. Speculations on nature and rate of heat transfer from steam through wet condenser tubes; author concludes that dry tube is most efficient, but that after film has once formed, thick film gives better heat transfer than thin one; suggests application of these ideas to condenser design.

CONVEYORS

Pneumatic. Pneumatic Conveying Plants for Agricultural Purposes, L. Engelbrecht. Eng. Progress, vol. 7, no. 12, Dec. 1926, pp. 327–328, 3 figs. Advantages and disadvantages of blowers, and kinds of materials which are suitable for pneumatic transport.

COPPER ALLOYS

Copper-Silicon. Merit in Copper-Silicon Alloys, M. G. Corson. Iron Age, vol. 119, no. 5, Feb. 3, 1927, pp. 353–356, 9 figs. Comparative cheapness, high strength, ease of working, and resistance to corrosion are salient features; problem of resistance to corrosion; chemical influence of silicon; silicon-copper alloys for castings.

High-Temperatures. Copper Alloys for High Temperatures, M. G. Corson. Brass World, vol. 22, no. 12, Dec. 1926, pp. 389–390, 1 fig. Additions of cobalt, chromium, silicides and beryllides have peculiar effects on hardness; diagram shows author's results of tests.

CORE OVENS

Gas-Fired. Gas Scores When Baking Cores, R. G. Van Gundy. Am. Gas Assn. Monthly, vol. 9, no. 1, Jan. 1927, pp. 19–22 and 48, 2 figs. Points out that advantages of gas fuel are readily apparent in study of conditions that have to be met.

COST ACCOUNTING

Contract Shops. Cost Estimating in Contract Shops, J. A. Thomas. Machy. (N. Y.), vol. 33, no. 5, Jan. 1927, pp. 369–370. Factors that enter into estimate; information recorded on time estimate sheet.

Industrial Plants. Costs in Profitable Manufacturing, W. L. Walker. Mfg. Industries, vol. 12, nos. 3 and 4, Sept. and Oct. 1926, pp. 213–216 and 293–297. Under conditions of competitive manufacture, facts secured by efficient up-to-date cost system may have numerous uses in managing concern in profitable channels; prominent among these uses are determining of actual costs of expense orders, such as repairs, renewals, etc.; actual costs of construction and equipment; cost of goods sold to ascertain profit and loss on sales made by groups or individual items.

COTTON

Yarn, Effect of Humidity on. The Effect of Humidity on Cotton Yarn, F. T. Peirce and R. J. Stephenson. Textile Inst.—Jl., vol. 17, no. 12, Dec. 1926, pp. T645–T660, 6 figs. Strength and extensibility of sized and unsized warp yarns in equilibrium with steady atmospheric conditions.

Yarn, Tensile Strength. Tensile Tests for Cotton Yarns, E. Midgley and F. T. Peirce. Textile Inst.—Jl., vol. 17, no. 12, Dec. 1926, pp. T661–T662. Rate of loading.

The Breaking of Yarns and Single Cotton Hairs, G. G. Clegg. Textile Inst.—Jl., vol. 17, no. 11, Nov. 1926, pp. T591–T606, 11 figs. Relation between strength of yarn and that of hairs from which it was spun.

COTTON MILLS

Testing. Testing in Cotton Mills. Textile World, vol. 69, nos. 3, 7, 11, 16, 24 and vol. 70, no. 3, Jan. 16,

Feb. 13, Mar. 13, Apr. 17, June 12 and July 17, 1926, pp. 39 and 41, 25 and 27, 43 and 45, 155–159 and 171, 51–57 and 43–47, 36 figs. Jan. 16: How product of each machine is tested for weight variation; combing tests. Feb. 13: Testing of roving. Mar. 13: Yarn testing. Apr. 17: Compares lea and single strand methods. June 12: Analyses cloth samples for ends and picks per inch, count of warp and filling yards per pound. July 17: Explains checking of waste and where change of cotton is made.

CRANES

Locomotive. A Locomotive Crane for Lifting 120 Tons, E. Altschul. Brown Boveri Rev., vol. 13, no. 12, Dec. 1926, pp. 279–282, 6 figs. Noteworthy crane of this type installed in Yverdon Repair Shops of Swiss Federal Railways; used for moving heaviest electric locomotives as well as for lifting either small or heavy loads during erection.

50-Ton Overhead Travelling Cranes, Horwich Works, L. M. S. R. Ry. Gaz., vol. 45, no. 27, Dec. 31, 1926, p. 787, 1 fig. Built to meet special conditions involved by large modern locomotives.

Locomotive Coaling. Eng. Progress, vol. 7, no. 12, Dec. 1926, pp. 337–338, 2 figs. Details of slewing crane constructed by Demag, Duisburg, Germany, with loading capacity of 2.75 tons; it consists of railway truck with traveling gear, slewable superstructure including hoisting gear, slewing gear, etc.

Wharf and Warehouse. Wharf and Warehouse Cranes, C. H. Woodfield. Elecn., vol. 97, no. 2535, Dec. 31, 1926, pp. 754–755 and 762, 3 figs. Electrical vs. hydraulic operation; layout details; braking systems; luffing devices.

CRANKSHAFTS

Balancing. Balancing Rotating Parts. Automobile Engr., vol. 16, no. 223, Dec. 1926, pp. 491–492, 2 figs. Gisholt method as applied to crankshafts, flywheels, etc.

Critical Velocity. Critical Velocity of Crankshafts (Sulle velocità critiche degli alberi a gomiti), S. R. Treves. Industria, vol. 40, nos. 14, 15 and 16, July 31, Aug. 15 and 31, 1926, pp. 369–371, 395–397 and 424–426, 8 figs. Necessity for accurate calculation of crankshafts, including critical velocity, to determine dimensions, etc., giving greatest safety in operation; types of critical velocity; critical torsional velocity.

CUPOLAS

Processes. Calculation of Cupola Processes and Practical Application (Die rechnerische Erfassung der Vorgänge im Kupolofen und ihre Verwertung fur Bau und Betrieb), K. Pfeiffer. Giesserei, vol. 13, nos. 46, 47 and 48, Nov. 13, 20 and 27, 1926, pp. 877–887, 893–897 and 913–920, 9 figs. Part I: Heat balance; relation between reduction and exhaust-gas temperature; influence of height of cupola, etc. Part II: Reduction process: time function; derivation of a formula for duration of contact between CO_2 and glowing carbon; temperature losses. Part III: Principles of heat transmission; formula for melting-zone and exhaust-gas temperature. Part IV: Comparison of melting tests; application of results of investigation to cupola design and operation.

CUTTING TOOLS

Multiple-Cutter Turner. Warner & Swasey Multiple-Cutter Turner. Am. Mach., vol. 65, no. 26, Dec. 23, 1926, pp. 1047–1048, 2 figs. Machine for taking two or more simultaneous cuts on bar stock or forgings, without disturbing accuracy of finished work and without excessive set-up time; time of piece is time used for longest cut.

CYLINDERS

Lapping. Bethel-Player Lapping Machines. Machy. (N. Y.), vol. 33, no. 5, Jan. 1927, pp. 385–386, 2 figs. Two new machines built by Bethel-Player Co., Westboro, Mass.; one is intended for use on cylindrical and flat parts in shops where production does not warrant one of larger machines built by this concern; other is designed for simultaneously lapping three parallel cylindrical holes in parts.

Machining. Cylinders for Outboard Motors, F. W. Curtis. Am. Mach., vol. 65, no. 26, Dec. 23, 1926, pp. 1027–1030, 15 figs. Inspecting castings for leakage; boring and reaming cylinders; various drilling operations; milling ports; hand-reaming and grinding bore; materials-handling truck.

Machining Cylinder Heads. Machy. (Lond.), vol. 29, no. 742, Dec. 30, 1926, pp. 409–413, 10 figs. Practice of Morris Motors (1926), Ltd., Engines Branch, Coventry.

D

DIE CASTING

Molds for. Making Molds for Die-Casting, J. H. Smit. Machy. (N. Y.), vol. 33, no. 6, Feb. 1927, pp. 441–444, 2 figs. Preparing die blocks; machining and matching cavities; making cores; factors to be considered in making molds for die casting; life of molds; causes of cracking; scored mold cavities.

DIESEL ENGINES

American Industry. The Diesel Engine's Position in American Industry, L. H. Morrison. Power, vol. 65, no. 2, Jan. 11, 1927, pp. 60–63, 8 figs. As revealed by survey of existing installations.

Lubricating-Oil Rectification. Oil Rectification. Automobile Engr., vol. 16, no. 223, Dec. 1926, pp. 494–495, 8 figs. Continuous renovation of lubricating oils.

Polar. New Polar Diesel-Engine Designs (Nagra nyare konstruktioner av polar-dieselmotorer), G. Dellner. Teknisk Tidskrift (Mekanik), vol. 56, no. 51, Dec. 18, 1926, pp. 155–161, 11 figs. Details of high-pressure 2-stroke engines up to 2700 i.hp., stationary and marine, built by Aktiebolaget Atlas Diesel at Stokholm, Sweden; fuel consumption, comparison of 4-stroke and 2-stroke types, etc.

Temperature Measurements. Electric Temperature Measurements on Diesel Engine (Répartition des températures et tensions d'origine thermique dans les moteurs à combustion interne), R. Sulzer. Revue Générale de Electricité, no. 20, no. 23, Dec. 4, 1926, pp. 845–857, 22 figs. Valuable data are obtained on internal thermal conditions of 2-cycle Diesel engine during its normal operation by novel arrangement of thermocouples and photographic recording of their potential by oscillograph; it was possible to obtain complete temperature records of heat conditions inside combustion chamber of Diesel engine during operating cycle of piston. See brief translated abstract in Elec. World, vol. 89, no. 3, Jan. 15, 1927, p. 160.

Thermal Efficiency. Investigations on the Efficiency of Diesel Engines, M. Ino. Soc. Mech. Engrs. (Japan)—Jl., vol. 29, no. 115, Nov. 1926, pp. 619–675, 30 figs. Deals with theoretical thermal efficiencies of actual cycles which seem likely to take place in Diesel-engine cylinder; comparison of theoretical thermal efficiencies of various cycles based on new theory; comparison of thermal efficiencies in airless-injection and air-injection engines under new theory of thermal efficiencies worked out by author.

DRILLING

Deep-Hole. Deep-Hole Drilling in Rifle Making, A. Murphy. Can. Machy., vol. 37, no. 2, Jan. 13, 1927, pp. 13–16, 10 figs. Unusual machining operations, necessitating both special and standard equipment found in Toronto rifle plant; groove cutting, straightening and manufacture of small parts.

DRILLING MACHINES

Multiple-Spindle. An Interesting Example of Multiple Spindle Drilling. Brit. Machine Tool Eng., vol. 4, no. 42, Dec. 1926, pp. 502–504, 4 figs. Interesting example of process in works of one of largest British commercial-vehicle builders.

Radial. Asquith Portable Radial Drill. Brit. Machine Tool Eng., vol. 4, no. 42, Dec. 1926, pp. 505–510, 13 figs. Examples of its application.

Wide Plates. A New Machine for Wide Plate Drilling. Brit. Machine Tool Eng., vol. 4, no. 42, Dec. 1926, pp. 497–498 and 520, 2 figs. New bogie pattern-plate radial drilling machine made by Wm. Asquith, Ltd., Halifax.

DROP FORGINGS

American Production Methods. Impressions of American Forging Methods, F. W. Spencer. Forging—Stamping—Heat Treating, vol. 12, no. 12, Dec. 1926, pp. 475–477. Impressions of American methods of producing drop forgings which were gained in tour through number of commercial drop-forge plants and forge departments connected with large automobile factories.

DURALUMIN

Hardness Testing. Hardness Testing of Thin Duralumin Sheet, T. W. Downes. Forging—Stamping—Heat Treating, vol. 13, no. 1, Jan. 1927, pp. 18–23, 3 figs. Methods of hardness testing and relation between hardness and mechanical properties of heat-treated, rolled duralumin sheet.

E

ECONOMIZERS

Draft Loss. Note on Economizer Draught Loss, B. M. Thornton. Mech. World, vol. 80, no. 2086, Dec. 24, 1926, p. 500, 2 figs. While it is shown that draft loss for most economical thermal efficiency is much higher than is generally realized, it should be borne in mind that this loss is not necessarily most economical for commercial efficiency; increased draft loss results in larger heat transfer in economizer, with result that economizer absorbs more heat and overall plant efficiency is increased.

High Pressures. Economizers Developed to Meet High Pressures. Power Plant Eng., vol. 31, no. 1, Jan. 1, 1927, pp. 29–32, 5 figs. Steel tubes with protected surfaces are outstanding features of economizer development.

EDUCATION, ENGINEERING

Curricula. A Summary of Opinions Concerning Engineering Curricula. Jl. of Eng. Education, vol. 17, no. 4, Dec. 1926, pp. 356–392, 8 figs. Two groups have been made, one dealing with content and arrangement of present-day curricula and evolutionary changes through which they have reached present form, and other with opinions of those most directly concerned as to fitness of curriculum for preparing student for his profession.

Extension Courses. Extension Courses in Engineering, C. M. Jansky. Jl. of Eng. Education, vol. 17, no. 4, Dec. 1926, pp. 410–423 and (discussion) 423–427. Preliminary report and condensed summary of results.

ELECTRIC FURNACES

Annealing. A New Type of Electric Annealing Furnace (Ein neuartiger elektrischer Tiefofen), E. F. Russ. Stahl u. Eisen, vol. 46, no. 52, Dec. 30, 1926, pp. 1878–1879, 3 figs. Furnace installed in Polish steel works for annealing of gun cylinders; with initial temperature of 20 deg., required annealing temperature of 850 deg. is reached in $2^1/_2$ hr. with current supply of 198 kw-hr.; cylinders are usually 3000 mm. long with diam. of 200 mm.; advantage of electric annealing consists in uniform heat distribution, in exact maintenance of desired temperature, simplicity of operation, and elimination of smoke and heat.

Brass Foundries. Use of the Electric Furnace in Non-Ferrous-Metal Foundries (L'utilisation des fours électriques dans la fonderie des alliages et des métaux non ferreux), A. Levasseur. Société Française des Electriciens—Bul., vol. 6, no. 60, Aug. 1926, pp. 893–913, 9 figs. Discusses causes that have hindered practical application of electric furnace in brass and other non-ferrous-metal foundries in France, and describes leading types of furnaces which have been applied to this work in United States, including resistance furnaces of Bailey, Rennerfelt, Morgan and Hoskins; arc furnaces of Booth, Detroit, Rennerfelt, and Brown Boveri; low-frequency induction furnaces of Ajax-Wyatt and Röchling-Rodenhauser; and high-frequency induction furnaces; electrothermal efficiency and power consumption of various types; yields are compared with those of older methods of heating; net gain is considered to be clearly on side of electric furnace.

Factories. Electric Furnaces in Manufacturing, N. R. Stansel. Iron & Steel Engr., vol. 3, no. 12, Dec. 1926, pp. 497–502, 11 figs. Details of electric-furnace equipment in Schenectady Works of General Electric Co.; while equipment includes both arc and induction furnaces, resistor-type furnace is by far most general in use; bulk heating; heat-treatment processes; maintenance.

Hardening. Hardening (Das Härten), E. Schmidt. Gewerbefleiss, vol. 105, no. 11, Nov. 1926, pp. 243–246, 5 figs. Details of electric salt-bath hardening furnace of German General Electric Co. (A. E. G.), used for hardening of tools and other steel products, especially where large quantities have to be handled; also used for hardening of files, etc.

Heat-Treating. Electric Rotary Furnace Automatically Operated, I. S. Wishoski. Fuels & Furnaces, vol. 5, no. 1, Jan. 1927, pp. 71–74 and 98, 5 figs. Furnace designed by Westinghouse Elec. & Mfg. Co. for heat treating of ball races; heat-treating operation is entirely automatic from time charge is placed in pan on hearth until it is discharged into basket by quenching tank conveyor; very uniform results are obtained.

High-Frequency Induction. The Use of High-Frequency Induction Furnaces for Production of High-Grade Steel (Ueber die Verwendung des Hochfrequenz-Induktionsofens für die Edelstahlerzeugung), F. Körber, F. Wever and H. Neuhauss. Stahl u. Eisen, vol. 46, no. 47, Nov. 25, 1926, pp. 1641–1649, 18 figs. Decarburization and deoxidation; production of carbon-poor and carbon-rich steel in high-frequency furnaces; possibilities of development.

Iron Foundries. Operating Experiences with an Electric Furnace in Foundry Practice (Betriebserfahrungen mit einem Elektroofen im Giessereibetriebe), R. Genwo. Stahl u. Eisen, vol. 46, no. 48, Dec. 2, 1926, pp. 1697–1701, 11 figs. partly on supp. plate. Arc furnace of Demag design, and its operation; details of charge and product; comparison of costs of converter and electric-furnace operation; melting of synthetic pig iron; gray cast iron and malleable castings in electric furnaces.

Melting. Electric Melting of Gray Iron Saves $30 per Ton, J. L. Faden. Elec. World, vol. 89, no. 3, Jan. 15, 1927, pp. 139–140, 1 fig. Castings produced at Century Electric Co.'s plant, St. Louis, with electric heat; Moore 'Lectromelt furnace of $^1/_2$-ton rated capacity was installed; service reliability and cost data significantly in favor of electricity.

Revolving-Retort. Rockwell Electric Revolving-Retort Furnaces. Am. Mach., vol. 66, no. 2, Jan. 13, 1927, p. 75, 1 fig. Machine is designed especially for annealing non-ferrous metal parts and has capacity ranging from 1500 to 2000 lb. per hr., according to weight, thickness and size of individual pieces.

ELECTRIC LOCOMOTIVES

Brazil. Electric Passenger Locomotive for the Paulista Railway Brazil. Ry. Engr., vol. 48, no. 564, Jan. 1927, pp. 17–20, 6 figs. Constructed by Metropolitan-Vickers Electrical Co.; it is 2-6-0 + 0-6-2 type 100-ton locomotive.

Japan. New Japanese Electric Passenger Locomotives. Tramway & Ry. World, vol. 60, no. 29, Dec. 9, 1926, pp. 323–327, 13 figs. Designs provide for standardization and interchangeability of parts; each locomotive has single box-type cab, having operating compartment at each end and equipment compartment between them; flexible heat-treated spur gears are used on both types of locomotives; wheel arrangement is 1C plus C1 for express locomotives and 1B plus B1 for local passenger units.

Storage-Battery. Czechoslovakian State Railways Electrification, P. Selver. Elec. Ry. & Tramway Jl., vol. 55, no. 1376, Dec. 10, 1926, pp. 366–368, 5 figs. As first step in development of scheme, storage-battery locomotive was constructed which is largest in world.

ELECTRIC WELDING, ARC

Gas-Electric Car. "Alternarc" Gas-Electric Welding Car. Am. Mach., vol. 66, no. 1, Jan. 6, 1927, p. 35, 1 fig. Electric Arc Cutting and Welding Co., Newark, N. J., has brought out gas-electric drive, self-propelled welding car; consists of standard gas engine mounted in standard truck car; generator provides both alternating and direct current for arc welding.

Oxidation of Arc Crater. Oxidation of the Arc Crater, P. Alexander. Am. Welding Soc.—Jl., vol. 5, no. 12, Dec. 1926, pp. 11–14. Discusses oxidation and nitrogenation of molten iron in crater of welding arc; study of relation of oxidation of surface of crater to number of gas pockets in solidifying metal.

ELEVATORS

Controllers. How Semi-Magnet Alternating-Current Elevator Controllers Operate, C. A. Armstrong.

Power, vol. 65, no. 3, Jan. 18, 1927, pp. 94–97, 10 figs. Operation of controllers used on hand-rope operated machines and construction of magnetic contactors used in this class of service.

EMPLOYEES' REPRESENTATION

Developments. Growth and Present Status of Employee Representation. Ry. Age, vol. 81, nos. 9 and 10, Aug. 28 and Sept. 4, 1926, pp. 365–369 and 423–426. Aug. 28: Fundamental principles and objectives; origin and development; Whitley plan in England; European developments; Leitch and Rockefeller plans. Sept. 4: Extent to which it has been applied on railroads; results.

ENGINEERS

Registration. Present Status of Registration of Engineers, A. Richards. Eng. News-Rec., vol. 97, no. 26, Dec. 23, 1926, pp. 1028–1029. In 25 states having laws, 27,277 engineers and surveyors have registered, of whom majority are civil engineers.

EVAPORATION

Rapid-Flow. A New High-Effect, Rapid-Flow Evaporator. Indus. Chemist, vol. 11, no. 23, Dec. 1926, pp. 551–552, 6 figs. Details of Vogelbusch patent evaporator; its method of operation is based chiefly on extremely high velocity with which liquid to be evaporated flows over heating surfaces, whereby exceptionally high specific transference of heat, as well as preservation of material in process is achieved.

F

FABRICS

Knitted. Thread Take-Up in the Seaming of Knitted Fabrics, H. S. Bell. Textile Inst.—Jl., vol. 17, no. 11, Nov. 1926, pp. T583–T587, 4 figs. Exact measurements have been taken for typical range of stitches made under working conditions, of amount of thread, exclusive of waste, used in seaming of knitted fabrics.

Yarns, Resistance to Abrasion. The Measurement of the Resistance of Yarns to Abrasion, A. E. Owen and J. Locke. Textile Inst.—Jl., vol. 17, no. 11, Nov. 1926, pp. T567–T582, 7 figs. Describes how abrasion tests may be conducted and in what manner and with what precautions results are to be interpreted.

FACTORIES

Otis Elevator Co., Yonkers, N. Y. New Otis Building Efficiently Planned, W. O. Moyer. Mfg. Industries, vol. 12, no. 6, Dec. 1926, pp. 413–418, 6 figs. Building has four stories and basement, and covers area of 350 by 100 ft.; floors are reinforced concrete; heating is by means of vacuum system; both a.c. and d.c. power are used in building; materials-handling equipment; numbering of buildings and departments.

FANS

Centrifugal. Operating Characteristics of Centrifugal Fans and Use of Fan Performance Curve. Am. Inst. Min. & Met. Engrs.—Advance Paper, no. 1626-A, Jan. 1927, 13 pp. Discussion of paper by L. W. Huber issued in pamphlet 1542-A, Feb. 1926.

Motor Drive for. Selecting the Motor Drive for Industrial Fans, G. Lee. Indus. Mgmt. (N. Y.), vol. 73, no. 1, Jan. 1927, pp. 56–60, 5 figs. Before selecting either fan or motor, every consideration should be given to choice of proper type of fan and to selection of right motor for driving it; deals with properties of fans and characteristics of different types of motors.

FATIGUE

Industrial. Industrial Fatigue, G. H. Shepard. Soc. Indus. Engrs. Bul., vol. 8, no. 11, Nov. 1926, pp. 23–32, 1 fig. Particular problems of wide industrial importance; laboratory researches; variations in output and other tests of performance; comparison of shifts of different lengths; length of working week; physiological effects; effect of aggregation, illumination, sitting, etc.

FLOW OF FLUIDS

Viscous Fluids. The Forces on a Cylinder in a Stream of Viscous Fluid, L. N. G. Filon. Roy. Soc.—Proc., vol. 113, no. A763, Nov. 1, 1926, pp. 7–27, 2 figs. Investigation to obtain formulas for lift and drag when solid cylinder is at rest in stream of viscous incompressible fluid, but no limitation is imposed upon magnitude of stream velocity.

The Laws of Similitude Applied to the Flow of a Viscous Fluid, M. Carmichel. Engineering, vol. 123, no. 3182, Jan. 7, 1927, pp. 27–30, 23 figs., partly on p. 26. Conclusions based on experiments, as follows: (1) Classification of phenomena existing downstream of submerged body, makes it possible to avoid confusion between surface of discontinuity and phenomena of circulation; (2) there is no difference between motion of body through fluid and motion of fluid past body; (3) laws of similitude make it possible to reduce motion of any fluid to that of typical fluid of liquid type, and to deduce from observations made with water, properties of all other fluids; (4) laws of similitude hold good for viscous fluids under conditions which had not previously been studied. Translated from French.

FLOW METERS

Electric. An Improved Electric Flow Meter, T. R. Harrison. Optical Soc. of America & Rev. of Sci. Instruments—Jl., vol. 13, no. 6, Dec. 1926, pp. 731–738, 4 figs. Brown electrically operated flow meter which avoids at one stroke electrical as well as mechanical difficulties previously encountered in flow meters. See also description in Eng. & Boiler House Rev., vol. 40, no. 6, Dec. 1926, pp. 303–308, 4 figs.

FLUE GASES

Corrosion by. Corrosion by Flue Gases, A. G. Christie. Power, vol. 65, no. 3, Jan. 18, 1927, pp. 87–88. Corrosion by flue gases has been prevalent in plants that use coals or oils high in sulphur; it is generally recognized that it is due to oxidation of sulphur in fuel not only to sulphur dioxide, but also to sulphur trioxide, which forms sulphuric acid on exposed surfaces.

FLUIDS

Density. The Density of Fluids, J. H. Shaxby. London, Edinburgh & Dublin Philosophical Mag., vol. 2, no. 11, Nov. 1926, pp. 1127–1136. Relation between density and temperature and latent heat of vaporization.

FLYING BOATS

Design. Systematic Study of Buoyancy of Flying Boats (Studio sistematico alla vasca dei galleggianti a scafo per idrovolanti). Rendiconti Tecnici della Genio Aeronautico, vol. 14, no. 3, Sept. 1926, pp. 1–14, 16 figs. Details of hydraulic tests of keels Nos. 16 to 45 (second series of experiments) as to stability and buoyancy with characteristic curves for each group.

FLYWHEELS

Machining. Machining Hupp Automobile Flywheels. Machy. (N. Y.), vol. 33, no. 5, Jan. 1927, pp. 361–362, 5 figs. Tooling equipment used for roughing and finishing semi-steel flywheels.

FORGING

Bolt and Nut. The Development of Bolt and Nut Forging, E. J. Wiley. Machy. (Lond.), vol. 29, no. 742, Dec. 30, 1926, pp. 430–434, 12 figs. History of development; Oliver machine; vertical-bolt press; rotary rivet machine; plunger-type tools; radial hammer machines; heading difficulties; use of bunting tools; reduction in bolt-head sizes.

Car-Axle Reclamation. Reclaiming Car Axles in Forging Machines. Machy. (N. Y.), vol. 33, no. 5, Jan. 1927, pp. 383–384, 2 figs. Reclamation of car axles up to annealing process can be accomplished in single machine built by Ajax Mfg. Co., Cleveland, O.; machine is new model 6-in. twin-geared upsetting forging machine, provided with increased power for die mechanism.

FORGINGS

Brass. Brass Forgings, O. J. Berger. Machy. (Lond.), vol. 29, no. 742, Dec. 30, 1926, pp. 414–415. Finish and strength of forgings; composition of material; equipment for forging shop; preparing forging blank; dies for hot-pressed parts; and for drop and steam hammers; limits on forging dimensions; importance of correct heating.

FOUNDRIES

Costs. Do More Foundries Know Costs, E. M. Taylor. Iron Age, vol. 119, no. 1, Jan. 6, 1927, pp. 27–31, 1 fig. Appraisal of situation after years of effort by Am. Foundrymen's Assn.; things cost committees have laid down as basic; problem before foundry industry is to convert 70 per cent of its members to use of dependable cost methods.

The Costing of Individual Castings, T. H. Hargrave. Metal Industry (Lond.), vol. 29, no. 26, Dec. 24, 1926, pp. 609–610, 4 figs. Debiting each grade of casting; outlines methods which have proved satisfactory in service, and provided the danger of over-elaboration is eliminated, there is no doubt that adoption of similar means could hardly fail to be of similar value to many foundries.

Engine Castings. Standardize Practice in Engine Castings, P. Dwyer. Foundry, vol. 54, no. 22, Nov. 15, 1926, pp. 900–904, 7 figs. Methods and equipment in foundry of C. & G. Cooper Co., Mt. Vernon, O., in preparing sand for use, etc.; mold and core ovens; types of molding machines employed; setting cores.

Fallacies and Practice. Some Fallacies in Foundry Practice. Metal Industry (Lond.), vol. 29, no. 23, Dec. 3, 1926, pp. 539–540. It is stated that cupola is most prolific source of misconceptions; arising mainly from fact that top of coke bed is actually first charge of coke; theories in connection with use of wet coke; many cupolas are worked inefficiently through application of too high blast pressure; effect of temperature on amounts absorbed.

Modern. A Modern Foundry (Eine neuzeitliche Giessereianlage), K. Schunck. Stahl u. Eisen, vol. 46, no. 48, Dec. 2, 1926, pp. 1701–1705, 6 figs. Equipment of old-fashioned and modern foundry; patternmaking and pattern storage; iron and sand handling; sand preparation; cleaning; laboratory and welfare work.

Non-Ferrous. Produce Large Tonnage in Small Space, E. Bremer. Foundry, vol. 54, no. 22, Nov. 15, 1926, pp. 888–891 and 908, 6 figs. Example of speed and dispatch in making non-ferrous castings in plant of National Bronze & Aluminum Foundry Co., Cleveland, O.; repeated use of sand at short intervals lowers equipment and floor space required; separate crews for various operations increase quantity of non-ferrous castings produced.

Progress, 1926. Refinements Mark Foundry Progress, D. M. Avey. Iron Trade Rev., vol. 80, no. 1, Jan. 6, 1927, pp. 26–27, 2 figs. In automotive foundries, use of power-driven, mold-conveying equipment with gravity-roller conveyor tables for return of idle flasks, bottom boards and sundries has become practically standard; improved methods of sand preparation and sand handling; tendency in cast-iron pipe shops has been toward general adoption of centrifugal-casting methods; adoption of preheating cupola of advanced design, in which gases are taken out of stack above melting zone, conducted through tubes of preheating chamber; application of electric furnaces.

Rate Fixing in. Piece-Rate Determination with Time and Work Studies (Stückzeitermittlung mit Zeit- und Arbeitsstudien), Lischka. Giesserei, vol. 13, no. 49, Dec. 4, 1926, pp. 933–944, 14 figs. Importance of a just piece-rate determination prompted German Foundrymen's Assn. to appoint a committee which works in conjunction with State Committee for Determination of Working Time (Refa), to establish piece rates on scientific and correct basis; describes and presents examples of Refa standard sheets, and defines their purpose.

Scrap, Use of. Briquette Borings for Cupola Use, F. L. Prentiss. Iron Age, vol. 119, no. 3, Jan. 20, 1927, pp. 211–213, 3 figs. Results in saving of $10 per ton; crushing of machine-shop turnings also features Dodge scrap department.

FUELS

Coal. See COAL; PULVERIZED COAL.

Lignite. See LIGNITE.

Oil. See OIL FUEL.

Production and Utilization. Production of Fuels and Their Utilization. Power, vol. 65, no. 1, Jan. 4, 1927, pp. 14–18, 3 figs. Interest in processing of coal is increasing; water-cooled walls, smaller furnaces, unit mills, turbulent burners and improved driers are feature in pulverized-coal field.

Pulverized Coal. See PULVERIZED COAL.

FURNACES, ANNEALING

Oil-Burning. Oil-Burning Annealing Furnaces, C. C. Hermann. Machy. (N. Y.), vol. 33, no. 5, Jan. 1927, pp. 357–358, 3 figs. Use of oil as heating medium in annealing furnaces employed in malleable-iron industry; details of oil burner; packing castings in annealing pots; annealing operation.

FURNACES, GAS

Brass-Melting. Performance of Gas Fuel in White Brass Furnaces. Gas Age-Rec., vol. 58, no. 26, Dec. 25, 1926, pp. 917–918. Stewart Die Casting Corp. is melting 30,000,000 lb. soft metal a year with gas; production is increasing; temperature control is simplified, and there is no investment in storage and handling equipment.

FURNACES, HEAT-TREATING

Producer-Gas Fired. Tube Mill Furnaces Fired with Raw Producer Gas, W. N. Robinson. Fuels & Furnaces, vol. 5, no. 1, Jan. 1927, pp. 87–90, 4 figs. Furnaces for annealing, normalizing, hardening and tempering of carbon and alloy-steel tubes at Ohio Seamless Tube Co. are being fired with producer gas; exceptional uniformity of heating secured and temperature and atmosphere readily controlled.

FURNACES, HEATING

Ingot-Heating. Thermal Efficiency of Ingot-Heating Furnaces (Wärmeleistung von Stossöfen), W. Tafel and H. Grünn. Stahl u. Eisen, vol. 46, no. 49, Dec. 9, 1926, pp. 1750–1752. Determination of heat-transmission coefficient between gases and ingots; application of results.

FURNACES, INDUSTRIAL

Design. Industrial Furnaces, C. Longenecker. Iron Trade Rev., vol. 79, nos. 10, 14, 16, 18, 20, 22, 24 and 26, Sept. 2, 30, Oct. 14, 28, Nov. 11, 25, Dec. 9 and 23, 1926, pp. 568–571, 843–845, 981–983, 1106–1108, 1231–1233, 1355–1357 and 1361, 1496–1498 and 1625–1627, 35 figs. Treatise on design, construction and function of modern melting, heating and treating units; intermediate or heating furnaces; reheating or finishing furnaces.

Practical Industrial Furnace Design, M. H. Mawhinney. Forging—Stamping—Heat Treating, vol. 12, no. 12, Dec. 1926, pp. 470–474, 5 figs.; vol. 13, no. 1, Jan. 1927, pp. 2–8 and 11, 3 figs. December: Historical development; fuels for industrial heating, present-day conditions and problems in selecting, buying and designing furnaces. January: Latest methods of utilizing various fuels for industrial furnaces; comparative costs of fuels.

European. Recent European Furnace Developments. Fuels & Furnaces, vol. 5, no. 1, Jan. 1927, pp. 51–55, 16 figs. Improvements in industrial furnaces and methods of operation; includes continuous furnaces for heating steel blooms and billets, recuperative forge furnace with integral gas producer; forge furnace with recuperative semi-gas firing; enameling furnace; bright annealing furnace, etc. Abstract translated from V.D.I. Zeit.

G

GAGES

Angular-Form. The Manufacture and Measurement of Angular-Form Gauges, E. A. Swift. Machy. (Lond.), vol. 29, no. 738, Dec. 2, 1926, pp. 265–268, 14 figs. Methods employed by author which have proved satisfactory.

Types. A Machine Shop Gage for Every Job, F. Horner. Can. Machy., vol. 36, no. 27, Dec. 30, 1926, pp. 170–172, 13 figs. Points out that types of anvils and measuring surfaces and their mode of application vary widely; ordinary gages now being superseded, in difficult screw-thread work, by intervention of accurately finished wires.

GASES

Calorific Value. Relationship Between the Calorific Value of a Gas and Either the Oxygen Necessary to Burn It, or Its Products of Combustion (Uber den Zusammenhang zwischen dem Heizwert eines Gases und den zu seiner Verbrennung erfordlichen Sauerstoff-Volumen, beziehungsweise den Verbrennungsprodukten), H. Fahrenheim. Gas- u. Wasserfach, vol. 69, no. 39, Sept. 25, 1926, pp. 838–840. Amount of oxygen necessary to burn 100 cc. of gas gives gross calorific value

when multiplied by 50.9 and net when multiplied by 45.85, these figures being the mean for series of gases and giving result in kg-cal. per cu. m.; greatest deviation from calorific value calculated from analysis is 1 per cent. See brief translated abstract in Chem. & Industry, vol. 45, no. 48, Nov. 26, 1926, p. 938.

Heat Transmission. Experimental Investigation of Heat Transmission From Gases in Motion to Water Tubes (Experimentella undersökningar å värmeöverföring från strömmande gaser till vattentuber under olika vinklar), T. Lindmark. Teknisk Tidskrift, vol. 56, no. 42, Oct. 16, 1926, pp. 125–131, 20 figs. Calculation of coefficient of heat transmission for angle of 90 deg. and others; experiments by Rietschel; experiments carried out at Technical High School (Sweden) between 1922 and 1926.

Metallurgical Combustible. Using Metallurgical Combustible Gases (Die Bewertung der hüttentechnischen Heizgase), M. Huffelmann. Brennstoff- u. Wärmewirtschaft, vol. 8, nos. 21 and 23, Nov. 1 and Dec. 1, 1926, pp. 350–354 and 391–394, 7 figs. Nov. 1: Derivation of Schack equation for gas radiation; comparison of theory and practice; heat transmission by radiation; effect of steam in gases. Dec. 1: Application of theoretical derivations to technical gases; comparison of theory and practice.

GASOLINE

Investigations. Investigation of Automobile Fuels, P. H. Comradson. Oil & Gas Jl., vol. 25, no. 28, Dec. 2, 1926, p. 111. Apparatus and methods for determination of solid residue, volatility and unsaturates in modern gasoline.

Knock Characteristics. Measurement of Knock Characteristics of Gasoline in Terms of a Standard Fuel, G. Edgar. Indus. & Eng. Chem., vol. 19, no. 1, Jan. 1927, pp. 145–146. Points out that standard fuel for evaluating knock characteristics of motor fuels is needed; new standard fuel, consisting of two pure paraffin hydrocarbons, seems capable of meeting this need; knock characteristics of gasolines can be expressed in terms of varying proportions to these hydrocarbons, practically independently of method of measurement.

GEAR CUTTING

Generators. Gear Generators Improved to Permit of Larger Cuts and Higher Speeds. Iron Age, vol. 119, no. 4, Jan. 27, 1927, p. 293, 1 fig. Changes made in design of Sykes generators built by Farrel Foundry & Machine Co., Buffalo, to permit of taking larger cuts and of operating at higher speeds; improvements are said to permit production of some types of gears in one-third of previous cutting time, and any gear within capacity of machine in about half of time previously taken.

GEARS

Planetary. Planetary Gears with Electric Control (Planetengetriebe mit elektrischer Schaltung), E. Fischer. Motorwagen, vol. 29, no. 31, Nov. 10, 1926, pp. 772–774, 5 figs. Details of Cotal planetary gear with three or four shifts for motor-bus or passenger-car drive.

Railway Traction. Railway Traction Gears and Pinions. Ry. Engr., vol. 48, no. 564, Jan. 1927, p. 6. Outlines experience of Southern Railway; gears and pinions were manufactured by Cincinnati Tool Steel & Pinion Co., U. S.; they are extremely accurate in all respects; author points out that extreme accuracy, which may be keynote for stationary machinery and motor cars, is not necessarily most suitable standard for railway-traction work.

GRINDING

Regrinding Practice. Outline Regrinding Practice, J. F. Pflum. Abrasive Industry, vol. 7, nos. 10 and 11, Oct. and Nov. 1926, pp. 312–314 and 342–343. Various experts give data from actual practice; cylinder grinding has followed automotive production closely.

Stellite. Grinding of Stellite Tools. Abrasive Industry, vol. 7, nos. 7, 8, 9 and 10, July, Aug., Sept. and Oct., 1926, pp. 215–218, 249–250, 281–282 and 309–311, 34 figs. July: Stellite cannot be worked with cutting tools; special fixtures provided for locating it for grinding; various operations described. Aug.: Diversity of grinding operations followed in shaping various parts; wheel selection of great importance; wet and dry grinding both performed. Sept.: Auxiliary equipment employed to provide abnormal spindle speeds; tool-grinding operations; wheel-selection data. Oct.: Polishing and grinding operations.

GRINDING MACHINES

Crankpin. The New Landis Crankpin Grinder. Automobile Engr., vol. 16, no. 223, Dec. 1926, p. 499, 1 fig. Machine embodying hydraulic feed drive and clamping mechanism.

H

HANGARS

Airship. The Karachi Airship Shed. Engineer, vol. 142, no. 3702, Dec. 24, 1926, pp. 684–686, 6 figs., partly on p. 690. Site of shed is desert about 13 miles east of Karachi; when finished it will have length of 850 ft., clear width inside of about 200 ft., 180 ft. at doors, and clear height at center of 170 ft.; it is provided with sliding doors at east end and with blank wall at west end; one of conditions of tender was that shed should be capable of being taken down if necessary and erected elsewhere; construction throughout is steel.

HARDNESS

Ball and Cone Tests. Hardness Tests Research. Machy. (Lond.), vol. 29, no. 742, Dec. 30, 1926, pp. 424–426, 1 fig. Report on diamond-cone indentation hardness tests; tests with various cones; comparison of results with other hardness tests; investigation shows that diamond cones can be used for accurate and reliable indentation tests on hard materials, and when results are corrected for adhesion or friction, direct comparison can be made with steel cone or ball test results on softer materials. (Abstract.) Paper read before Instn. Mech. Engrs.

Brinell Test. Brinell Test Depth Indicator. Engineering, vol. 122, no. 3180, Dec. 24, 1926, pp. 784–785, 3 figs. Instrument brought out by A. J. Amsler & Co. Switzerland, known as imprint depth indicator, constituting ball carrier and depth measurer combined.

Standardizing the Brinell Hardness Test, H. M. German. Am. Soc. Steel Treating—Trans., vol. 11, no. 1, Jan. 1927, pp. 54–61 and (discussion) 61–72, 2 figs. Points out defects in different types of Brinell machines and describes new design which will overcome these defects and eliminate personal factor of operator, thereby standardizing Brinell test.

Scleroscope Test. Methods of Hardness Testing. Am. Mach., vol. 65, no. 26, Dec. 23, 1926, p. 1041, 3 figs. Scleroscope and its use; reference-book sheet.

HEAT TRANSMISSION

Equations. Rules for Heat Transmission (Regole sintetiche sulla trasmissione del calore), A. Sellerio. Industria, vol. 40, no. 18, Sept. 30, 1926, pp. 478–479, 1 fig. Refers to article by Praetorius in Archiv für Wärmewirtschaft, p. 199, 1926, suggesting that term "conductivity" in transmission through walls be dropped and term "resistance" be substituted, resulting in more simple and clear equations; author approves this change and explains resulting changes in calculation.

Radiation. The Radiation and Convection of Heat, T. Barrett. Eng. & Boiler House Rev., vol. 40, no. 7, Jan. 1927, pp. 369–373, 3 figs. Laws of radiation and convection; experiments by author have shown that amount of heat lost from surface at given temperature excess over its surroundings depends not only on area of surface exposed and on its temperature, but also on shape and disposition of surface; results of experiments apply to practical engineering problems, such as insulation of furnaces, boiler pipes, refrigeration chambers, etc., and transmission of heat in water-tube boilers.

Turbulence and. Turbulence and Heat Transfer, L. G. Bousquet. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 33, no. 1, Jan. 1927, pp. 29–36, 5 figs. Presents data showing effect of kind of air flow set up by fan on rate of heat transfer of two types of indirect heaters, namely, cellular and fin-and-tube types.

HEAT TREATMENT

Use of Gas in. The Use of Gas in the Typewriter Industry, R. L. Manier. Gas Age-Rec., vol. 58, no. 26, Dec. 25, 1926, pp. 907–908, 3 figs. Points out that use of gas has proved its worth in plant of L. C. Smith Typewriter by producing highest quality work at lowest possible cost consistent with such quality; details of tool-treating equipment; gas-fired Japan ovens; carbonizing machine, etc.

HEATING AND VENTILATION

Hotels. Design and Operation of Hotel Heating and Ventilating Systems, B. Natkin. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 33, no. 1, Jan. 1927, pp. 11–22, 5 figs. System installed in Hotel President, Kansas City; details of power plant, steam and ventilating systems.

HEATING, ELECTRIC

Residences. Heating Residences with Electricity, A. S. L. Barnes. Can. Engr., vol. 51, no. 23, Dec. 7, 1926, pp. 695–696. General use not commercially feasible; from investigations made by Ontario Hydro-Electric Power Commission and discussed in symposium on Heating Residences presented at meeting of Ontario Section, A.S.M.E., Toronto.

HEATING, HOT-AIR

Forced-Air Furnace. Forced-Air Furnace Heating, A. M. Daniels. Sheet Metal Worker, vol. 17, no. 24, Dec. 31, 1926, pp. 967–969 and 1005, 4 figs. Principles of design in furnace-fan heating systems; results of tests at University of Illinois.

Pipe Sizes. Estimating Warm-Air Pipe Sizes. Sheet Metal Worker, vol. 17, no. 24, Dec. 31, 1926, pp. 964–966, 3 figs. Practical demonstration of application of standard code method.

HEATING, STEAM

Atmospheric System. Typical Steam Heating Installation Using the Atmospheric System, T. F. Moffett. Plumbers Trade Jl., vol. 82, no. 1, Jan. 1, 1927, pp. 48–50, 6 figs. Treating fundamental design which has demonstrated its excellent heating efficiency and proved value of equipment of simplified type.

Radiator Finishes. Comparative Tests of Radiator Finishes, W. H. Severns. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 33, no. 1, Jan. 1927, pp. 23–28, 3 figs. Concludes from investigation that certain standard finish must be made basic standard of comparison for tests of radiator finishes; color, chemical composition of finish pigments, and vehicle used to carry pigments of basic finish must be defined, if comparative results are to be useful and easily understood; reduction of heat transmitted by radiator coated with aluminum bronze is not as much as 25 per cent, as widely reported for all classes of radiators, but that it may range from 18 per cent for special and very effective radiators down to 9 per cent or less for wider and higher, column-type, steam radiators.

Vacuum. Vacuum Heating, C. A. Thinn. Universal Engr., vol. 44, no. 6, Dec. 1926, pp. 20–23, 4 figs. Advantages of vacuum heating system are: economical use of fuel; use of minimum pipe sizes; it gives partial temperature regulation; eliminates air valves on radiators; makes possible use of exhaust steam with minimum back pressure on engine; is positive in circulation; requires low initial steam pressure; has quick circulation, etc.

HOBBING MACHINES

Spur and Helical Gears. Gould & Eberhardt Manufacturing Hobbing Machine. Machy. (N. Y.), vol. 33, no. 5, Jan. 1927, p. 385, 1 fig. Steel spur gears up to 36 in. in diameter and having teeth as large as 3 diametral pitch can be cut on production basis in manufacturing hobbing machine by Gould & Eberhardt, Newark, N. J. See also Iron Age, vol. 118, no. 27, Dec. 30, 1926, p. 1826, 1 fig.

Schuchardt & Schutte Gear-hobbing Machine Machy. (N. Y.), vol. 33, no. 5, Jan. 1927, pp. 387–388, 2 figs. Improved type of Schuchardt & Schutte hobbing machine for spur and helical gears; worm wheels can also be hobbed on this machine by use of special tangential-feed cutter head and tapered hob.

HYDRAULIC TURBINES

Impulse. Hydraulic Turbine To Operate Under Nearly One Half Mile Head. Power, vol. 65, no. 3, Jan. 18, 1927, pp. 82–85, 7 figs. Largest impulse-wheel unit ready for operation under highest head so far utilized in United States; water-jet over 7 in. in diameter with velocity of 370 ft. per sec.; governing of unit and safety devices provided of special interest; installed at San Joaquin Light & Power Corp., Fresno, Cal.

Testing. Equipment for Turbine Testing at the Kristinehamn Shops (Anordningar för provning av turbiner vid verkstaden Kristinehamn), H. Lind. Teknisk Tidskrift (Mekanik), vol. 56, no. 47, Nov. 20, 1926, pp. 141–151, 11 figs. Testing station and hydraulic laboratory; activity since 1900; equipment for determining quantity of water, head, braking power, efficiency, etc.

Theory. Hydrodynamic Methods of Investigating the Turbine Theory (Hydrodynamische Methoden der Turbinentheorie), B. Eck. Berichte u. Abhandlungen der Wissenschaftlichen Gesellschaft für Luftfahrt, no. 13, May 1926, pp. 108–113, 11 figs. Deals with theory of hydraulic turbine; axial and radial wheels; specific speed; influence of turbine characteristics on design of airplane and ship propellers.

HYDROELECTRIC DEVELOPMENTS

St. Lawrence River. The St. Lawrence Power Development. Contract Rec., vol. 40, no. 50, Dec. 15, 1926, pp. 1189–1191. Answers to 11 specific questions contained in instructions to Joint Board of Engineers; supplementary information to that published in Contract Rec. of Dec. 1.

United States, 1926. Water Power Development 11,176,596 Hp. Elec. World, vol. 89, no. 1, Jan. 1, 1927, pp. 51–52, 2 figs. Third of available power in United States now harnessed; 83 per cent on public-utility plants.

Water-Power Development Active. Power, vol. 65, no. 1, Jan. 4, 1927, pp. 25–28, 8 figs. One of outstanding major projects is St. Lawrence; installation of 8 units in Muscle Shoals plant, totaling 260,000 hp., was completed during year; outstanding project from point of size on which work was started is Conowingo; other developments.

HYDROELECTRIC PLANTS

Argentine. The Power Station Cachueta in Argentina. Eng. Progress, vol. 7, no. 12, Dec. 1926, p. 336, 2 figs. Station in Province of Mendoza utilizes head of 42 m. obtained by cutting off loop of Mendoza River and artificial damming of river; intake tunnel is 2366 m. long and has gradient of 1 in 1000; water is conducted through tunnel to reservoir situated directly above power station, from which at present 2 pipe lines lead to 2 turbine sets erected in station; vertical-shaft turbines have speed of 500 r.p.m. and are direct coupled with generators, producing 3-phase current of 500 and 50 cycles.

Belgium. Hydraulic Power (La force hydraulique), P. de Boeck. Union des Ingénieurs, Sortis des Ecoles Speciales de Louvain, vol. 53, bul. 2, Oct. 15, 1926, pp. 3–39, 21 figs. General principles of hydroelectric plant planning and construction; details of first Belgian plant on River Warche whose 3 falls will give 50 million kw-hr. per year.

Brazil. Works of the Cubatao Hydroelectric Plant (As obras da grande installaçao hydro-electrica de cubatao, da companhia "The S. Paulo Tramway Light and Power"). Revista Brasileria de Engenharia, vol. 12, no. 4, Oct. 1926, pp. 119–128, 8 figs. Describes first installment of 40,000 hp., one-eighth of entire plant, recently put in operation; pressure piping; generating plant with Pelton wheels, barrage dam, etc.

France. Hydroelectric Plant in Chancy-Pougny (L'usine génératrice hydroélectrique de Chancy-Pougny), M. Barrere. Revue Générale de Électricité, vol. 20, no. 18, Oct. 30, 1926, pp. 633–641, 12 figs. Modern low-head hydroelectric plant is latest station to be added to French 120-kv. national power bus; river drop of 19 ft. supplies 5 horizontal water-wheels, each directly coupled to 7000-kva. umbrella-type 3-phase generator rated at 11,000 volts, 50 cycles; low speed of 83.3 r.p.m. required 72 poles per rotor; methods used to carry out final tests; includes data in tabulated form and performance curves. See brief translated abstract in Elec. World, vol. 89, no. 3, Jan. 15, 1927, p. 159.

The Chancy-Pougny Hydroelectric Plant (L'usine génératrice hydroélectrique de Chancy-Pougny), J. Reyval. Revue Générale de l'Electricité, vol. 20, no. 7, Aug. 14, 1926, pp. 250–254, 8 figs. Plant is equipped with 5 turbines, each of 8700 hp. at 83.3 r.p.m. under head of 8.87 m., coupled to 7000-kva., 11,000-volt, 50-cycle alternators and 370-hp. turbine driving 300-kva., 220-volt alternator at 375 r.p.m.; results of tests on main units; characteristic curves for Escher-Wyss

turbine and one by Ateliers des Charmilles; design of latter is based upon preliminary investigations with scale model; at reduced head of 6.3 m., it is capable of developing 5900 hp. See brief translated abstract in Sci. Abstracts (Section B), vol. 29, no. 348, Dec. 25, 1926, p. 570.

Italy. Statistics of Water Utilization as Motive Power (Statistica delle grandi utilizzazioni idrauliche per forza motrice), A. Rampazzi. Annali dei Lavori Pubblici, vol. 64, no. 8, Aug. 1926, pp. 653–658. Condensed statistics of all hydroelectric plants of Italy in operation or under construction, by districts, horsepower, heads, alternating and direct current, storage reservoirs, etc.

Low Head. Hydroelectric Utilization of Low Heads (Aprovechaminetos hidroélectricos de Pequeño desnivel), C. Botin. Revista de Obras Publicas, vol. 74, no. 19, Oct. 1, 1926, pp. 430–433, 12 figs. Various types of plants in Germany, France, etc., with plans and elevations of dams and power houses; their advantages and disadvantages.

Maryland. Construction of Great Water Power Plant Well Under Way. Eng. News-Rec., vol. 97, no. 27, Dec. 30, 1926, pp. 1024–1026, 5 figs. Conowingo hydroelectric project on Susquehanna River to be second only to Niagara in initial installation; dam to be 4800 ft. long.

Oregon. Western Hydroelectric History, W. C. Foster. Jl. of Electricity, vol. 57, no. 12, Dec. 15, 1926, pp. 447–449, 4 figs. Details of Station B, Portland Electric Power Co., located at Willamette River at Oregon City.

Quebec. The Construction of the Isle Maligne Power Plant, Quebec. Engineering, vol. 122, no. 3179, Dec. 17, 1926, pp. 747–750, 9 figs., partly on supp. plate. Details of one of two stations which will have combined capacity of over 1,000,000 hp., some of which will be used for papermaking; present plant consists of power house in which eight 45,000-hp. units have been installed.

Remote Control. Hanna Chute Plant for Ontario Hydro on Georgian Bay System. Elec. News, vol. 35, no. 24, Dec. 15, 1926, pp. 27–29, 2 figs. Operated entirely by remote control from neighboring generating station; vertical generator, spring-type thrust bearing, propeller-type turbine.

Sweden. Lilla Edet Central Station (Lilla Edets Kraftverk), E. Millén. Teknisk Tidskrif. (Allmänna Ardelningen), vol. 56, nos. 36 and 38, Sept. 4 and 18, 1926, pp. 329–336 and 345–348, 18 figs. Details of construction; dams and reservoir; machinery building; Kaplan turbines of 5.8 m. diameter and Lawaczeck turbines of 6 m. diameter; direct coupled generators of 10,000 to 11,000 volt for 10,000-kva. 3-phase current, etc.

Water Supply, Estimating. Estimating Probable Water Supply for Power Plants (Wassermengenprognose für ein Kraftwerk), G. Beurle. Schweiz. Elektrotechnischer Verein—Bul., vol. 17, no. 10, Oct. 1926, pp. 457–462, 4 figs. Method used by Partenstein (Austria) power plant for predicting probable quantity of water available, so as to avoid as far as possible firing of too many boilers.

I

IMPACT TESTING

Notched-Bar Tests. Law of Similarity in Connection with the Notched-Bar Test (Das Aehnlichkeitsgesetz bei der Kerbschlagprobe), R. Mailänder. Stahl u. Eisen, vol. 46, no. 49, Dec. 9, 1926, pp. 1752–1757, 9 figs. Review of results obtained by Stribeck, Schüle and Moser; tests on three different steels to determine influence of notch diameter and size of test piece.

INDICATORS

Mean-Pressure. A Mean-Pressure Indicator (Das "pi-Meter," ein Mitteldruck-Indikator), J. Geiger. Schweizerische Bauzeitung, vol. 88, no. 21, Nov. 20, 1926, pp. 281–283, 8 figs. Instrument developed by author for indicating mean pressure in cylinders of reciprocating engines of all kinds at any given moment; in some cases it gives continuous records.

INDUSTRIAL MANAGEMENT

Budgetary Control. Enforcing the Budget, J. H. MacDonald. Indus. Mgmt. (N. Y.), vol. 73, no. 1, Jan. 1927, pp. 49–52. Discusses following questions: should expenditures in excess of budget be prohibited? Should revision of budget be permitted, and if so, when and how? What action should be taken when variations are significant? Can incentives be used as maeans of securing fulfilment of budget, andif so, how? Factors considered in paying bonus.

Fatigue. See FATIGUE.

Labor Wastes, Eliminating. Eliminating Labor Wastes by Providing Improved Mechanical Facilities, H. J. Payne. Soc. Indus. Engrs. Bul., vol. 8, no. 11, Nov. 1926, pp. 9–20, 7 figs. Discusses possibilities for eliminating wastes in labor through use of mechanical devices; fundamental principles underlying installation of materials-handling equipment.

Production Control. Electrical Equipment for Production Control (Elektrische Hilfsmittel für die Fertigungskontrolle), F. Ludwig. V.D.I. Zeit., vol. 70, no. 51, Dec. 18, 1926, pp. 1709–1712, 10 figs. Points out that machine shop or factory can be controlled in simpler manner and with similar equipment to those employed in central stations with their distribution system; in this way production rate of different working processes and working rhythm can be controlled.

Systematic Control of Production, C. O. Herb. Machy. (N. Y.), vol. 33, no. 5, Jan. 1927, pp. 345–349 10 figs. How work is effectively routed through large plant building woodworking machinery.

Small Plants. Management Problems in the Small Plant, H. P. Wherry. Mfg. Industries, vol. 12, nos. 3, 4, 5 and 6, Sept., Oct., Nov. and Dec. 1926, pp. 207–210, 257–260, 355–358 and 419–422. Sept.: Factors which experience proves are most important for successful business operation. Oct.: Difficulties to be met and overcome in organizing and operating sales and production activities. Nov.: Equipment, production control, costs, material handling and packing methods require special executive supervision. Dec.: Building organization and establishing financial control.

Time Study. See TIME STUDY.

Waste Elimination. Management's Part in Waste Elimination, H. V. Coes. Soc. Indus. Engrs. Bul., vol. 8, no. 11, Nov. 1926, pp. 3–8. Advantages of budget; modern business ailments and ailment indicators; presents summary of concrete studies management should initiate.

Reducing Waste in Management, T. D. Nevins. Soc. Indus. Engrs. Bul., vol. 8, no. 11, Nov. 1926, pp. 21–22. Case where waste was reduced by established coördination between sales and office.

INDUSTRIAL PLANTS

Location. Six Major Factors in Plant Location, H. S. Colburn. Mfg. Industries, vol. 12, no. 6, Dec. 1926, pp. 409–412. Discusses important changes introduced by modern industrial conditions; influence of aviation; incoming competition.

INDUSTRIAL RELATIONS

Changing Conditions. The Changing Relations Between Employer and Employee, W. L. Abbott. Mech. Eng., vol. 49, no. 1, Jan. 1927, pp. 17–20. Growth of corporation; newer understanding between employer and employee; conditions in building trades and coal industry; dawn of new order and part of engineer therein.

INDUSTRIES

Credit Factor and. The Credit Factor in the Structure of Industry, D. R. Dewey. Mech. Eng., vol. 49, no. 1, Jan. 1927, pp. 12–15. New uses and expansion of credit as dominating characteristic of present century; modern forms of credit; installment buying; credit as remedy for economic and social ills. Henry Robinson Towne lecture on Relation between Engineering and Economics.

Financing. Financing Industries in Baltimore City, G. H. Porter. Mfg. Industries, vol. 12, no. 6, Dec. 1926, pp. 433–438. During decade of successful operation, Industrial Corporation of Baltimore City has established requirements of proper financial investigation of manufacturing concern; these are given and fully explained; they apply more particularly to smaller industries.

INSULATION, HEAT

Theory and Practice. Modern Insulation Theory and Practice, G. Y. Pitts and J. Hatton. Ice & Cold Storage, vol. 29, no. 345, Dec. 1926, p. 321. Review of two papers read before North-Western Section of Brit. Cold Storage and Ice Assn.; area of insulation; overall cost of refrigeration; temperature rise with machinery standing; variation of conductivity.

INTERNAL-COMBUSTION ENGINES

Vibrations in Shafts. The Properties of Torsional Vibrations in Reciprocating Engine Shafts, G. R. Goldsborough. Roy. Soc.—Proc., vol. 113, no. A764, Dec. 1, 1926, pp. 259–271, 1 fig.; also (with H. Baker) pp. 272–281, 9 figs. Pp. 259–271: Torsional vibrations in shaft; examines effect of reciprocating parts in producing or modifying vibrations; for this purpose model is proposed which is as simple as can be conceived, and which at same time involves characteristics of reciprocating motion. Pp. 272–281: Summary of torsional effects which appear with variation in speed.

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; OIL ENGINES.]

IRON

Stainless. The Tensile Properties of Stainless Iron and Other Alloys at Elevated Temperatures, P. G. McVetty and N. L. Mochel. Am. Soc. Steel Treating—Trans., vol. 11, no. 1, Jan. 1927, pp. 73–93 and (discussion) 93–100 and 169, 18 figs. Discusses tensile properties of annealed stainless iron and hot-rolled Monel metal at temperatures up to 500 deg. cent., and compares them with similar properties of seven other materials; presents charts showing that comparison of normal-temperature tensile properties of materials does not indicate their relative value at elevated working temperatures; gives data to show effects of sustained tension loading at high temperature upon tensile properties of materials at that temperature; describes modified form of Martens extensometer which combines simplicity and ease of operation with high degree of precision of measurement. Bibliography.

IRON ALLOYS

Brinell Balls. Iron-Carbon-Vanadium Alloy for Brinell Balls, G. W. Quick and L. Jordan. Am. Soc. for Steel Treating—Preprint, no. 3, for mtg. Jan. 20–21, 1927, 22 pp., 5 figs. Special alloy of about 2.9 per cent carbon and 13 per cent vanadium has been experimentally used for Brinell balls in testing of steels of such hardnesses as cause ordinary Brinell balls to deform both elastically and plastically; these special balls, heat-treated, work-hardened, and tested against steels of approximately 700 Brinell, flattened about 1/3 as much as Hultgren balls and 1/5 as much as ordinary Brinell balls; opinion that hardness obtainable in plain carbon steel by combined heat treatment and cold work is maximum hardness to be secured by such treatments is shown to be untrue.

L

LABOR TURNOVER

Reduction of. Labor Turnover: How Is Its Significance Best Presented to Supervisors? E. J. Benge. Personnel Research—Jl., vol. 5, no. 8, Dec. 1926, pp. 293–297. Discusses ways by which foremen and executives may be made to feel responsibility for labor turnover.

LAPPING MACHINES

Hole. Bethel-Player No. 1-H Semi-Automatic Hole-Lapping Machine. Am. Mach., vol. 66, no. 2, Jan. 13, 1927, pp. 73–74, 1 fig. Semi-automatic machine, to lap ground holes in hardened ring-gages, tappet-rolls, valve-guides, bushings and similar parts.

LATHES

Car-Axle-Burnishing. Putnam Car-Axle Burnishing Lathe. Am. Mach., vol. 65, no. 26, Dec. 23, 1926, p. 1045, 1 fig. Putnam Machine Division, Manning, Maxwell & Moore, Fitchburg, Mass., has placed upon market, machine for burnishing journals of car axles.

LIFTING MAGNETS

Electric. Electric Lifting Magnets. Elecn., vol. 97, no. 2535, Dec. 31, 1926, pp. 758–759, 4 figs. Design and constructional details; methods of coil winding and insulation; impregnating procedure.

LIGNITE

Mining and Treatment. The Occurrence, Working, and Treatment of Brown Coals, R. Redmayne. Colliery Guardian, vol. 132, nos. 3441 and 3443, Dec. 10 and 24, 1926, pp. 1279–1281 and 1402–1403, 9 figs. With special reference to German practice. Paper read before Inst. Fuel Technology.

North Dakota. The North Dakota Lignites, L. Pistner. Minn. Federation Arch. & Eng. Societies—Bul., vol. 12, no. 1, Jan. 1927, pp. 11–24, 2 figs. Study of development of fuel supply for Northwest.

LOCOMOTIVE BOILERS

Design. Boiler Details of the "Lord Nelson" Locomotive, Southern Railway. Ry. Engr., vol. 48, no. 564, Jan. 1927, pp. 21–24, 7 figs. Boiler contains superheating apparatus, header being of Maunsell type fitted with air relief valves; provided with Belpaire pattern firebox.

LOCOMOTIVES

Developments, 1926. An Era of Intensive Locomotive Development, C. B. Peck. Ry. Age, vol. 82, no. 1, Jan. 1, 1927, pp. 49–53, 7 figs. Baldwin high-pressure test data; future of high-steam pressures; Diesel locomotives; trend of European developments; passenger-car and freight-car developments; use of lacquers.

Diesel-Engined. Present State of Diesel-Locomotive Design (Der heutige Stand des Diesellokomotivbaues), H. Brown. Ingenieur, vol. 41, no. 47, Nov. 20, 1926, pp. 1–37, 129 figs. Experiments to design more efficient locomotives; advantages and disadvantages of Diesel drive; power transmission; indirect drive; electric transmission; reversing gears; hydraulic transmission; power transmission by means of gases and vapors.

The First Diesel Locomotive with Electromagnetically Operated Gear Transmission System, B. A. Wittkuhns. Diesel & Oil Engine Jl., vol. 2, no. 5, Dec. 1926, pp. 13–18, 7 figs. Describes gear or mechanical transmission system with special reference to first high-powered locomotive equipped with this system which was built for Russian State Railways.

Electric. See ELECTRIC LOCOMOTIVES.

Express. 2C1 Standard Express Locomotive of the German State Railway (2C1-Einheits-Schnellzuglokomotive der Deutschen Reichsbahn), D. F. Fuchs, and D. R. P. Wagner. Zeit. des Vereines deutscher Ingenieure, vol. 70, no. 52, Dec. 25, 1926, pp. 1725–1744, 50 figs. Principles governing design and construction of standard locomotives; influence of standardization; details of express locomotive built as 4-cylinder compound and as 2-cylinder locomotive.

Internal-Combustion. Internal-Combustion Locomotives for Railway and Industrial Purposes. Ry. Engr., vol. 48, no. 564, Jan. 1927, pp. 16 and 27, 2 figs. Two useful types manufactured by Crossley Bros., designed for switching about factory premises and yards.

Steam-Turbine. The Turbine Locomotive of the Firm of J. A. Maffei (Die Turbinenlokomotive der Firma J. A. Maffei). Zeit. des Vereines deutscher Ingenieure, vol. 70, no. 47, Nov. 20, 1926, pp. 1565–1572, 22 figs., partly on supp. plate. New express locomotive for boiler pressure of 22 atmos.; surface condensation with spray recooling on tender; auxiliary machines; process of condensation; feedwater preheating.

Superheating. Modern Locomotive Superheating, H. E. Geer. Ry. Gaz., vol. 45, no. 26, Dec. 24, 1926, pp. 755–756 and (discussion) 767. Superheat characteristics; position of regulator; impeding efficiency. (Abstract.) Paper read before Instn. Locomotive Engrs.

Union Pacific Type. Union Pacific Type Locomotive Performance. Ry. Age, vol. 81, no. 26, Dec. 25, 1926, pp. 1265–1267, 3 figs. Little maintenance difficulty encountered compared with gain in power and fuel economy in 3-cylinder, 6-coupled locomotive known as Union Pacific type.

Wheel Arrangements. Locomotive Types: The Economics of Wheel Arrangement. Oriental Engr., vol. 7, nos. 1 and 2, Mar. and Apr. 1926, pp. 13–21, and 25–35, 10 figs. There are 27 different wheel arrangements among 1148 locomotives on government rail-

ways; consideration of what types are good; how to choose best types to meet specific conditions.

LUBRICATING OILS

Cleaning. Lubricants: The Cleaning of Dirty Oil, A. Seton. Machy. (Lond.), vol. 29, no. 742, Dec. 30, 1926, p. 413. Points out that installation of recovery plant is very desirable when annual consumption of oil is high, and savings affected certainly more than balance interest on capital outlay involved.

LUMBER

Simplified-Practice Recommendation. Lumber. U. S. Dept. of Commerce—Simplified Practice Recommendations, no. 16, July 1, 1926, 91 pp., 28 figs. Lumber classifications; nomenclature of commercial softwoods; yard lumber; structural material; softwood factory and shop lumber; lumber-inspection provisions and service; lumber abbreviations; brief history of standardization.

M

MACHINE SHOPS

Heavy Machinery. Workshop Methods in Heavy Engineering, H. I. Brackenbury and W. J. Guthrie. North-East Coast Instn. Engrs. & Shipbldrs.—Advance Paper, Dec. 10, 1926, 11 pp., 3 figs. Deals with methods of manufacture of large machines or engines involving machining operations which are not of repetition nature, and to which methods of quantitative production do not apply.

MACHINE TOOLS

Design. The Trend of Machine Tool Design. Machy. (Lond.), vol. 29, no. 740, Dec. 16, 1926, pp. 321–322. Developments of importance to users of machine tools.

Developments, 1925. Tools of the Year. Machy. (Lond.), vol. 29, no. 740, Dec. 16, 1926, pp. 323–373, 102 figs. Descriptive review of machines introduced during 1925. Includes index of these tools on pp. 348–349.

Railway Shops. Machine Tools Ordered During 1926, L. R. Gurley. Ry. Age, vol. 82, no. 1, Jan. 1, 1927, pp. 113–116, 6 figs. Tabular data showing substantial increase in amount of shop equipment ordered in 1926 as compared with 1925.

MACHINERY

Labor-Saving. Has Manufacturing Machinery Made Good? D. S. Kimball. Mfg. Industries, vol. 12, no. 6, Dec. 1926, pp. 425–427. It is claimed by many that labor-saving and time-saving machines have not lightened human toil; author attacks this fallacy showing that it is not based on facts; effect of automatic appliances; refers to English conditions before industrial revolution and compares them with conditions today.

Welded-Steel vs. Cast-Iron Parts. 50 Per Cent Cost Reduction in Machine Parts, R. E. Kinkead. Mfg. Industries, vol. 12, no. 6, Dec. 1926, pp. 423–424, 5 figs. Claims use of welded steel instead of gray-iron castings for machinery bases, frames and other parts, offers effective method of reducing manufacturing costs.

MALLEABLE CASTINGS

Black-Heart. Lancashire Foundrymen Discuss Malleable Castings. Foundry Trade Jl., vol. 34, no. 538, Dec. 9, 1926, pp. 510–512. Discussion of paper by A. E. Peace on manufacture and properties of black-heart malleable cast iron; defects of black heart; early beginnings; molding troubles; origin of black fracture; effect of subsequent heat treatment; comparison of American and British pig iron; obtaining low carbon; heat-treatment limitations.

MALLEABLE IRON

Annealing. Continuous Annealing of Malleable Iron, G. Blakney. Fuels & Furnaces, vol. 5, no. 1, Jan. 1927, pp. 79–82 and 90, 5 figs. Continuous malleable kiln 195 ft. long, operating on 120-hour cycle, anneals 25 tons of castings per day; kiln is gas-fired and is equipped with automatic temperature control.

Notes on Annealing Blackheart Malleable, C. Kluijtmans. Foundry Trade Jl., vol. 34, no. 540, Dec. 23, 1926, pp. 550–554, 19 figs. Overheated, underannealed, over-annealed and burnt iron; metallurgical reactions; annealing defects; overheated bars; cooling range.

MECHANICS

Perturbation Theory. Quantification as a Problem of Characteristic Values (Quantisierung als Eigenwertproblem), E. Schrödinger. Annalen der Physik, vol. 80, no. 5, July 13, 1926, pp. 437–490, 9 figs. Perturbation theory and its application to Stark effect and H. Balmer lines; tables are given containing observed and calculated intensities, and these are plotted in series of diagrams.

Undulatory. Principles of the New Undulatory Mechanics (Les principes de la nouvelle mécanique ondulatoire), L. de Broglie. Jl. de Physique et le Radium, vol. 7, no. 11, Nov. 1926, pp. 321–337. Sets forth general principles of new undulatory conception of mechanics suggested by author and confirmed by recent works of Schrödinger; seeks to show, in particular case of constant fields, how results of Schrödinger extend and complete results obtained by author; investigation to determine if these ideas can be extended to variable fields and to dynamics of systems.

The Undulatory Mechanics of Schrödinger (La mécanique ondulatoire de Schrödinger), L. Brillouin. Académie des Sciences—Comptes Rendus, vol. 183, nos. 1 and 4, July 5 and 26, 1926, pp. 24–26 and 270–271. July 5: Author considers general method of resolution by successive approximations; finds that mechanics of Schrödinger includes older quantum mechanics as first approximation, and indicates simplest case which may be resolved by separation of variables. July 26: Discusses general type of problem which permits separation of variables in undulatory mechanics of Schrödinger.

METAL DRAWING

Neck-Drawing Operations. Dies Draw Supply-Tank Body to Shape, F. W. Curtis. Am. Mach., vol. 65, no. 27, Dec. 30, 1926, pp. 1065–1067, 10 figs. Sequence of operations and dies required to form shell; type of die used for 6 neck-drawing operations; air-operated mandrel used for threading.

METAL WORKING

Cold-Roll Forming. Cold Roll Forming. Iron Age, vol. 119, no. 4, Jan. 27, 1927, pp. 291–292, 4 figs. Channels, loud speaker and other sheet-metal parts formed on production basis; cold forming machines employed are of Kane & Roach, Syracuse, N. Y., design, and are of outside roll type. See also description in Am. Mach., vol. 66, no. 4, Jan. 27, 1927, pp. 194–195, 1 fig.

METALS

Acid-Resisting. Acid-Resisting Engineering Metals (Das Problem der säurefesten metallischen Werkstoffe), W. Guertler. Zeit. für Metallkunde, vol. 18, no. 12, Dec. 1926, pp. 365–376, 21 figs. Chemical susceptibility and affinity of metals; direct, thermochemical and electrochemical methods of determining relationship of metals; behavior of metals in electrolytes; behavior of heterogeneous alloys and of metallides.

Gas Occlusion by. Occlusion of Gases by Metals and Alloys in Liquid and Solid States, K. Iwasé. Tôhoku Imperial Univ.—Science Reports, vol. 15, no. 4, Oct. 1926, pp. 531–566, 35 figs. Solubilities of hydrogen, nitrogen, CO and CO_2 in pure metals and in alloys have been determined under one atmospheric pressure and at various temperatures; solubilities in liquid state are much greater than those in solid state, and temperature coefficients differ according to these states; solubilities increase as temperature rises, except in case of CO and CO_2. (In English.)

Plasticity. On the Plasticity of Metals, H. Shòji. Tôhoku Imperial Univ.—Science Reports, vol. 15, no. 4, Oct. 1926, pp. 427–442, 26 figs. Definition of plasticity of metals; apparatus for experiments; results of experiments at room temperatures; new definition is proposed for plasticity; plasticity of ductile metals decreases more rapidly with period of strain as compared with other metals. (In English.)

On the Plasticity of Metals at High Temperatures, H. Shôji and Y. Mashiyama. Tôhoku Imperial Univ.—Science Reports, vol. 15, no. 4, Oct. 1926, pp. 443–447, 6 figs. Plasticity of lead, tin and cadmium have been measured at various temperatures; plasticity increases very rapidly with rise of temperature and becomes very large at melting points; elastic limit or yielding point of metals decreases with rise of temperature and becomes zero at melting points. (In English.)

Specific Heat. Specific Heat of Metals at Low and at Very High Temperatures (Chaleur spécifique dés métaux aux basses et aux trés hautes temperatures), G. Moressée. Revue Universelle des Mines, vol. 12, no. 6, Dec. 15, 1926, pp. 217–239, 1 fig. Ultra-violet waves characteristic of metals; rotational energy of atoms; total atomic mechanical energy; applications to lead and silver; investigation to determine specific heats in function of temperature.

X-Ray Examination. Examining Metals by Means of X-Rays (Genomlysning av metaller medelst röntgenstrålar), J. Härdén. Teknisk Tidskrift (Allmänna Ardelningen), vol. 56, no. 37, Sept. 11, 1926, pp. 337–340, 8 figs. Methods of examining semi-finished products, such as nickel, chrome and tungsten steels, for structural and other defects, and most recent X-ray tubes used.

METHANOL

Synthetic. Synthetic Methanol and Liquid Fuels from Coal, G. Patart. Tech. Eng. News, vol. 7, no. 6, Dec. 1926, pp. 260–262, 288 and 290, 4 figs. Details of process developed by author; first experiments on catalytic reaction under high pressure; methanol production by high-pressure catalysis; chemical and mechanical realization of synthesis of alcohol. Paper read before Int. Coal Conference, Pittsburgh.

MOLDING METHODS

Piston Rings. Molding and Casting of Medium-Size and Large Piston Rings (Ein Beitrag zum Formen und Giessen für mittlere und grosse Kolbenringe), H. Eckart. Zeit. für die Gesamte Giessereipraxis, vol. 47, no. 52, Dec. 26, 1926, pp. 509–511, 6 figs. Describes procedure, with aid of sketches, in production of piston rings on jarring machines.

MOLDS

Drying. Drying of Molds at Foundry Show in Düsseldorf, 1925 (Die Trocknung der Formen auf der 4. Giessereifachausstellung 1925 in Düsseldorf), H. Luyken. Giesserei, vol. 13, nos. 50 and 52, Dec. 11 and 25, 1926, pp. 957–969 and 997–1004, 28 figs. Presents numerous drawings showing developments of drying equipment from simplest oven to most modern systems; heat balance of drying equipment and other thermotechnical investigations.

MOTOR-BUS TRANSPORTATION

Developments. The Motor Bus As a Means of Highway Transportation, C. W. Stocks. Eng. News-Rec., vol. 98, no. 2, Jan. 13, 1927, pp. 80–83, 4 figs. Growth and development with figures as to present-day operation; industry regulated in 38 States and not tax-free; outlook for future.

Fleet Maintenance. Maintaining a Fleet of 61 Buses on the Boston & Maine. Ry. Age, vol. 81, no. 26, Dec. 25, 1926, pp. 1285–1289, 11 figs. Presents tables covering period of five months showing bus-miles made in regular and special service; facilities at Boston and at Portsmouth; garages and maintenance methods; inspection and forms used; problem of spare parts.

MOTOR BUSES

Developments, 1926. Bus Development Continued Steadily. Elec. Ry. Jl., vol. 69, no. 1, Jan. 1, 1927, pp. 33–39, 1 fig. Number of electric railways engaged in bus operation increased approximately 20 per cent during 1926, while number of buses increased more than 40 per cent; much new route mileage added; replacement of rail service comparatively slight; large purchases made of other automotive equipment.

MOTOR TRUCKS

German Show. Berlin Motor-Truck Show, 1926 (Lastkraftwagen-Ausstellung Berlin 1926), H. R. Müller. Fördertechnik u. Frachtverkehr, vol. 19, no. 26, Dec. 24, 1926, pp. 399–401, 4 figs. Describes certain noteworthy innovations.

Motor Trucks at Automobile Show in Berlin, 1926 (Deutsche Automobilausstellung Berlin 1926), A. Wrede. Städtereinigung, vol. 18, no. 23, Dec. 15, 1926, pp. 577–604, 28 figs. Describes types of motor trucks and equipment exhibited.

N

NOZZLES

Discharge. Experimental Determination of the Coefficient of Discharge of Nozzles (Détermination expérimentale du coefficient de débit des tuyères fonctionnant en écoulement libre), Rateau, Leroux and Bourgeat. Académie des Sciences—Comptes Rendus, vol. 183, no. 4, July 26, 1926, pp. 259–266, 7 figs. Two sets of nozzles were used, one conical, and other having as section arc of circle, and all with rounded entry; larger-diameter nozzles had greater coefficient of discharge than smaller ones, and this was especially evident at small heads.

O

OIL ENGINES

Airless-Injection. A Survey of Modern Airless Injection Oil Engines, N. J. Griffin. Junior Instn. Engrs., vol. 37, Nov. 1926, pp. 45–76, 22 figs. Considers engines of 2-stroke and 4-stroke cycles; attempt is made to discriminate as to cases in which one might prove more suitable than other.

Applications. Oil Engines in Many Fields. Power, vol. 65, no. 1, Jan. 4, 1927, pp. 23–24, 4 figs. Central stations continue to purchase Diesels for isolated stations; increase in export business due to developments in South American oil fields; several railroads have purchased oil-engine locomotives for both branch and main-line services.

Heavy-Oil. Heavy Oil Engines and Their Application in Aeronautics (Motori ad olio pesante ed applicazioni aeronautiche), A. Levi-Cases. Revista Aeronautica, vol. 2, no. 11, Nov. 1926, pp. 41–67. Discusses 4-stroke Diesels, fuel injection and low-power engines, indirect injection, fuel consumption of heavy oil engines, reducing weight of engines; 2-stroke engines, safety in operation, etc. Bibliography.

Report on Heavy-Oil Engine Working Costs (1925–26). Diesel Engine Users Assn., no. S 74, Nov. 1926, 15 pp., 5 figs. Operating costs in four large American stations; engine cost per unit generated; analysis of costs in 37 installations in British Isles; lubricating-oil consumption; repairs and maintenance costs.

Primm. The "Primm Oil Engine." Diesel & Oil Engine Jl., vol. 2, no. 5, Dec. 1926, pp. 31–32, 3 figs. Single-cylinder, horizontal, two-cycle, mechanical injection, low-compression oil engine with crosshead feature embodied in its design.

OIL FUEL

Burners. Improvement in Oil Burners, E. H. Peabody. Power, vol. 65, no. 3, Jan. 18, 1927, pp. 109–110, 3 figs. Wide-range return-line system lends itself admirably to idea of putting control of fires in one place, where proper instruments for observing operating conditions may also be installed. Abstract of paper presented before Am. Petroleum Inst.

Diesel-Engine. Diesel Oil (Treiböl), H. Kühl. Petroleum, vol. 22, no. 26, Sept. 10, 1926, pp. 977–983, 2 figs. Water content of Diesel oils should not exceed 1 per cent, oil should still be liquid at 5 deg., or, in case of coal-tar oil, nothing should separate out at 15 deg.; in general, viscosity should not exceed 3 deg. Engler at 20 deg.; merits of oil from petroleum, lignite and coal, and low-temperature carbonization, and probable duration of petroleum supply. See brief translated abstract in Chem. & Industry, vol. 45, no. 48, Nov. 26, 1926, p. 939.

Self-Ignition. Experiments on Self-Ignition of Liquid Fuels, K. Neumann. Nat. Advisory Committee for Aeronautics—Tech. Memorandums, no. 391, Dec. 1926, 25 pp., 15 figs. Conversion of chemical energy of fuel into heat exhibits same outward characteristics in airless-injection Diesel engines as in all internal-combustion engines; three main divisions can be distinguished: (1) time from entrance of fuel into cylinder until ignition occurs; (2) main combustion from

beginning of pressure increase to maximum combustion pressure; (3) after-combustion during expansion; time within which individual processes take place is of great mportance for working process; experiments to obtain nsight into processes which could be mathematically utilized. Translated from Zeit. des Vereines deutscher Ingenieure, Aug. 7, 1926.

Submerged Combustion. Submerged Combustion of Liquid Fuels. Oil Eng. & Technology, vol. 7, no. 128, Dec. 1926, pp. 519–521. New development in efficient extraction of heat from fuel; Hammond system.

OPEN-HEARTH FURNACES

Design. Development of Open-Hearth Design, C. Longenecker. Blast Furnace & Steel Plant, vol. 14, no. 12, Dec. 1926, pp. 526–529, 2 figs. Development of open hearth from inception and various types of regenerative steel-melting furnaces reviewed; principles and operation.

Problems. The Present Knowledge of Open-Hearth Furnaces (Der heutige Stand unserer Kenntnisse vom Siemens-Martin-Ofen), E. Herzog. Stahl u. Eisen, vol. 46, nos. 47 and 50, Nov. 25 and Dec. 16, 1926, pp. 1631–1641 and 1777–1790, 25 figs. Heat transmission in hearth; gases, slag and metallic-oxide vapors and soot as bearers of flame radiation; soot formation from tar and through decomposition of gaseous hydrocarbons; importance of high preheating of blast-furnace and coke-oven mixed gases; effect of exhaust-gas distribution; heat storage, etc.

OXYACETYLENE WELDING

Bronze. Bronze Welding Applications, W. C. Swift. Welding Engr., vol. 11, no. 12, Dec. 1926, pp. 26–28. Developments in use of bronze welding in repair and production. Paper read before Int. Acetylene Assn.

P

PATENTS

Copyright Law vs. Patent vs. Copyright Law for Industrial Designs, J. D. Myers. Engrs. & Eng., vol. 43, no. 12, Dec. 1926, pp. 318–320. Substitution of copyright for patent protection for designs, and repeal of design patent laws is basic change embodied in legislation officially known as H.R. Bills 6249 and 13117; author discusses far-reaching effects of this change, which, he claims, will not be to encourage production of industrial designs; it is distinctly a step backward, and against public interest.

PIPE, CAST-IRON

Centrifugally Cast. Casts Iron Pipe, D. M. Avey. Foundry, vol. 54, no. 24, Dec. 15, 1926, pp. 972–977, 8 figs. and vol. 55, no. 1, Jan. 1, 1927, pp. 511, 9 figs. Birmingham, Ala., establishment has built and put into operation first commercial centrifugal cast-iron pipe plant using molds lined with green sand; plan continuous operation. Jan. 1: Comprehensive sand-preparation and conveying system supplies molding machines; sand layer is reamed from around poured pipe. See also Iron Trade Rev., vol. 79, no. 26, Dec. 23, 1926, pp. 1609–1613 and 1628, 8 figs.

PISTONS

Clearance. Piston Clearance, R. J. Anderson and M. A. Beckman. Automobile Engr., vol. 16, no. 223. Dec. 1926, pp. 486–490, 12 figs. With special reference to split-skirt type cast in aluminum.

PLANERS

Bevel-Gear. 19-Inch Spiral Bevel Gear Planer. Machy. (Lond.), vol. 29, no. 738, Dec. 2, 1926, pp. 270–272, 4 figs. Recent development of Oerlikon Machine Tool Works, Switzerland, suitable for cutting all standard tooth pitches up to $2^1/_2$ diametral pitch, being equivalent to 1.2 circular pitch or 10 module; machine is of reciprocating-tool continuously rotating work type; two tools work simultaneously planing opposite sides of teeth, but not of same tooth; these tools move straight-line motion directed always toward apex of cone of which wheel or pinion blank is truncated part.

PNEUMATIC TOOLS

Railway Shops. Pneumatic Tools on the Oregon Short Line, L. C. Morrow. Am. Mach., vol. 66, no. 2, Jan. 13, 1927, pp. 41–44, 8 figs. Face grinder especially valuable in finishing welded spots; easy way to grind-in superheater headers; taking work out of grinding throttle valves and standpipes; three keyway tools.

PRESSURE VESSELS

Head Rupture. Examination of the Ruptured Head of the Ethylene Tank, S. W. Miller. Mech. Eng., vol. 49, no. 2, Feb. 1927, pp. 117–123, 26 figs. Description of test pieces taken; macro and micro photographs; chemical analysis; tensile tests; microstructures; conclusions regarding welds, weld metal, and test pressure used on tank.

Stresses. Stresses in a Large Welded Tank Subjected to Repeated High Test Pressures, T. W. Greene, Mech. Eng., vol. 49, no. 2, Feb. 1927, pp. 124–133, 13 figs. Details of test of 5-ft. tank 40 ft. long; theoretical considerations; measured stresses and strains in various sections of shell, around head knuckles and manhole, and in replaced manhead with ring-reinforced manhole.

POWER

Progress, 1926. Progress in the Power Field. Power, vol. 65, no. 1, Jan. 4, 1927, pp. 2–8, 11 figs. All power output and capacity records have been broken; interconnection of power systems increasing rapidly and hydroelectric developments make good progress; rate of 12,600 B.t.u. per kw-hr. maintained in steam plant for full month; higher pressures in ascendancy; progress in water-cooled surface and air preheaters; unit mills popular in pulverized-coal records.

PSYCHOLOGICAL TESTS

Mechanical-Ability Test. A Mechanical Ability Test, T. W. MacQuarrie. Personnel Research—Jl., vol. 5, no. 9, Jan. 1927, pp. 329–337, 7 figs. Describes paper-and-pencil performance test for mechanical ability; it consists of seven parts printed together in booklet; it measures something other than mental alertness, since it correlates less than 0.20 with group mental test.

Metal Workers. Selective Placement of Metal Workers, M. Pond. Personnel Research—Jl., vol. 5, no. 9, Jan. 1927, pp. 345–368, 1 fig. Investigation of use of intelligence tests in selection of factory workers made in New England brass factory.

PULVERIZED COAL

Developments. Progress in the Burning of Pulverized Coal. Power Plant Eng., vol. 31, no. 1, Jan. 1, 1927, pp. 9–16, 7 figs. Discussion of types of furnaces used, preparation and burning of coal, use of air preheaters and various operating experiences.

Fineness and Structure. Degree of Fineness and Structure of Pulverized Coal (Feinheit und Struktur des Kohlenstaubs), P. Rosin and E. Rammler. V.D.I. Zeit., vol. 71, no. 1, Jan. 1, 1927, pp. 1–7, 23 figs. Shows that degree of fineness and structure of pulverized coal produced in pulverizers, has no relation to design of pulverizer and method of grinding; sole factors governing choice of pulverizer are initial and operating costs.

South Africa. Pulverized Fuel in South Africa. S. African Engr., vol. 16, no. 102, Oct. 1926, pp. 17–19. Equipment in new station at Congella; work of Electricity Supply Commission.

PUMPS

Corrosion. Some Cases of Corrosion in Chemical Works Pumps, H. Seymour. Indus. Chemist. vol. 11, no. 23, Dec. 1926, pp. 562–565, 4 figs. Corrosion in chemical-works pumps is due chiefly to action of acids, and when unsuitable materials have been used in construction of such pumps, parts made of non-resistant metal will enter into chemical combination with acid; by far the great majority of corrosion phenomena are due to combined chemical and mechanical action on material.

Electrically Driven. Electrically Driven Pumps, F. Johnstone-Taylor. Elec. Times, vol. 70, no. 1834, Dec. 16, 1926, pp. 743–744, 3 figs. With special reference to automatic and remote control.

Industrial. Pumps for Industrial Purposes, I. Watson. Indus. Chemist, vol. 11, no. 23, Dec. 1926, pp. 553–556, 3 figs. Deals with pumps for chemical works, boiler pumps, and with pumps for general purposes.

PUMPS, CENTRIFUGAL

Boiler-Feed. Characteristics of Centrifugal Feed Pumps. Eng. & Boiler House Rev., vol. 40, no. 7, Jan. 1927, pp. 339–344, 2 figs. Discusses this type of pump, indicating trend of developments in British practice.

Suction. Suction Effect of Centrifugal Pumps (Die Saugwirkung bei Kreiselpumpen), P. Schmidt. V.D.I. Zeit., vol. 71, no. 3, Jan. 15, 1927, pp. 81–84, 8 figs. Points out that flow at inlet of centrifugal pumps is due to the suction of blades; corrosion in wheels of pumps is due mainly to wrong shape of blades at inlet; influence of suction on pumping efficiency.

R

RAILS

Corrugation. Study of Undulatory Wear of Rails (Contribution à l'étude de l'usure ondulatoire des rails), C. Fremont. Génie Civil, vol. 89, no. 20, Nov. 13, 1926, pp. 425–428, 13 figs. Investigation begun in 1920 relative to wear by abrasion; effect of tangential shock on wheels of vehicle; in addition to abrasion, factor tending to produce corrugation is spreading of metal on working surface of rail, resulting in formation of lateral burrs or bulges, which indicate local crushing; investigation of hardening as function of thickness of metal affected, and its influence on resistance of rail; author insists on necessity for employing photography in investigations of strength of steel, not only for study of local deformation in undulations, but also to ascertain various shapes taken by those undulations, their unequal distribution, etc.; describes method of investigation which he has introduced. See translated abstract in Engineer, vol. 142, no. 3702, Dec. 24, 1926, pp. 692–693.

French Specifications. Note on the New French Railway Specifications for Steel Rails, L. Cambournac. Int. Ry. Congress Assn.—Bul., vol. 8, no. 11, Nov. 1926, pp. 994–1006, 3 figs. Comments on principal requirements of standard specification; method of manufacture; particulars of tests to be made before acceptance; results required to be given by tests; specifications for steel rails.

Stresses. On the Measurement of Stress of Rails Caused by Train Running, H. Shibata. Dept. of Railways, Govt. of Japan—Bul., vol. 14, no. 11, Nov. 1926, pp. 1341–1355, 10 figs. Second report on dynamic studies of rails. (In Japanese.)

RAILWAY MOTOR CARS

Gasoline-Electric. Detroit Toledo & Ironton Railroad New Gas-Electric Cars. Ry. & Locomotive Eng., vol. 39, no. 12, Dec. 1926, pp. 337–338, 1 fig. Two new cars placed in regular service between Delary, Mich., and Bainbridge, O., are said to be fulfilling expectations by maintaining schedule of passenger-train service.

Speed Gears for. Speed Gears for Railway Motor Cars. Eng. Progress, vol. 7, no. 12, Dec. 1926, p. 330, 1 fig. Describes two types of gears designed for 4-axle cars with two motors, made by Friedrichshafen Gear Wheel Factory; they are designed for automatic gear shifts according to principles elaborated by Soden, but they differ from former types inasmuch as they are fitted for combined electric and pneumatic remote control.

RAILWAY OPERATION

Train Control. Rapid Progress in Automatic Train Control in 1926. Ry. Age, vol. 82, no. 1, Jan. 1, 1927, pp. 130–133, 2 figs. Active construction program closes year with all but five installations under first order in service and 23 roads with second division complete.

RAILWAY SIGNALING

Developments, 1926. 1926 Greatest Year in History for Signals and Interlocking. Ry. Signaling, vol. 20, no. 1, Jan. 1927, pp. 3–16, 2 figs. Records established for mileage and levers installed; new interest in spring switches and automatic signal interlockings; prospects for 1927.

Interlocking. Rock Island Installs Several Automatic Interlockings, J. H. Molloy. Ry. Signaling, vol. 20, no. 1, Jan. 1927, pp. 27–30, 6 figs. Mechanical plants replaced at saving of $5000 per year; principle of operation is similar to regular automatic signaling; special feature that prevents departing train from holding signals against other road; neither road can hold crossing for following moves if train is waiting on other line.

RAILWAY TRACK

Concrete Base. Will the Track of the Future Be Supported on Concrete? Ry. Eng. & Maintenance, vol. 23, no. 1, Jan. 1927, pp. 5–8, 9 figs. Pere Marquette began practical test by operating trains over quarter mile of special track construction in which rail are supported directly on concrete slab, in order to determine practicability of this form of construction. See also description in Ry. Age, vol. 82, no. 2, Jan. 8, 1927, pp. 174–177, 8 figs.

RAYON

Viscose Process. Rayon by the Viscose Process, F. D. Snell. Chem. & Industry, vol. 45, no. 50, Dec. 10, 1926, pp. 925–926. Notes on cellulose, mercerization, crumbing, xanthate, spinning, purification, gloss and transparency, etc.

REFRACTORIES

Porosity. On the Effect of Porosity upon Thermal Conductivity, Diffusibility, and Heat Capacity at High Temperatures, Y. Tadokoro. Tôhoku Imperial Univ.—Science Reports, vol. 15, no. 4, Oct. 1926, pp. 567–596, 17 figs. Results of experiments show that porosity varies similarly to gas permeability; both thermal expansion and crushing strength decrease as porosity of material increases; diatomaceous earth is one of best insulating materials occurring in nature. (In English.)

Stresses in. Stresses in Refractory Materials (Zur Frage der Beanspruchung feuerfesten Werkstoffes), H. Kornfeld. Stahl u. Eisen, vol. 46, no. 50, Dec. 16, 1926, pp. 1790–1795, 5 figs. Discusses simple linear heat-transmission problems; stresses of furnace linings, most favorable wall thickness or heat insulation to employ.

Testing. Refractory Materials, Their Testing and Behavior in Metallurgical Works (Feuerfeste Baustoffe, ihre Prüfung und ihr Verhalten im Hüttenbetriebe), E. H. Schulz. Stahl u. Eisen, vol. 46, no. 47, Nov. 25, 1926, pp. 1667–1678, 3 figs. Economical importance of refractories in iron and steel industry; methods of testing them; points out need for further research, work of special committees of German Iron & Steel Inst.; principles underlying establishment of standards of quality; importance of coöperation between laboratories and steel works, and between steel works and manufacturers of refractories.

REFRIGERANTS

Ethyl Chloride. Refrigerants-Ethyl Chloride, H. J. Macintire. South. Power Jl., vol. 44, no. 12, Dec. 1926, pp. 59–60, 1 fig. Presents chart supplied by Bureau of Standards which gives pressure exerted, temperature and total heat.

RIVETING

Welding vs. The Riveting and Welding Processes. Machy. (N. Y.), vol. 33, no. 5, Jan. 1927, pp. 350–351. Welding as applied to boilers; ductility and fatigue resistance; machine-driven rivets; future developments.

ROLLING MILLS

Safety in Design. Bethlehem Steel Company's New Gautier Mills from a Safety Standpoint, J. Northwood. Iron & Steel Engr., vol. 3, no. 12, Dec. 1926, pp. 495–497, 7 figs. In designing and laying out new mills, question of safety was important consideration and every detail was worked out carefully so that mills could be operated with maximum production and safety.

Time Studies. Comparative Time Studies of Rolling Mills with Special Regard to Rod Mills (Vergleichende Zeitstudien an Walzwreken, insbesondere an Drahtstrassen), K. Rummel and P. Berger. Stahl u. Eisen, vol. 46, no. 47, Nov. 25, 1926, pp. 1649–1666, 17 figs. Time studies of five different rod mills and results; time indicator; conclusions based on investigation.

S

SCREW MACHINES

Tangential Chaser. A New Line of Screwing Machines. Brit. Machine Tool Eng., vol. 4, no. 42, Dec. 1926, pp. 516–519, 4 figs. Incorporation of tangential chaser in new line of bolt and tube screwing machines, Kendall & Gent, Ltd.

SEAPLANES

German Competition. The German Seaplane Competition 1926 (Der Deutsche Seeflug-Wettbewerb 1926), F. Gosslau. Zeit. des Vereines deutscher Ingenieure, vol. 70, nos. 49 and 50, Dec. 4 and 11, 1926, pp. 1641–1648 and 1672–1674, 37 figs. Account of competition held at Warnemünde in July; purpose of contest was development of a reliable, seaworthy machine for mail-carrying purpose; details of participating planes; results and conclusions; wooden vs. metal construction; water vs. air cooling.

SHAFTS

Power-Transmitting. Installation of Power Transmitting Shafts, J. H. Rodgers. Machy. (N. Y.), vol. 33, no. 5, Jan. 1927, pp. 363–365, 3 figs. Lineshafts for group drives; reducing twisting moment; suitable location of motor drive; specific case of inefficient installation.

Torsional Vibration. The Torsional Vibration of Shafts and Shaft Systems, R. Lochner. Instn. Elec. Engrs.—Jl., vol. 65, no. 360, Dec. 1926, pp. 76–80, 4 figs. General theory of torsional oscillation is reviewed, and method is then evolved by which investigation of any number of vibrating masses is considerably simplified.

SHEARS

Two Movable Knives. Shears with Two Movable Knives, J. Hahn. Iron Age, vol. 118, no. 27, Dec. 30, 1926, pp. 1811–1814, 19 figs. Steel-mill unit designed for cutting upward; clean cut ends among advantages; avoids depressing table.

SHEET METAL

Shearing and Blanking. Wear Resistance of Cutting Edges of Blanking Dies and Shear Blades, W. J. Merten. Am. Soc. for Steel Treating—Preprint, for mtg. Jan. 20–21, 1927, no. 2, 11 pp., 6 figs. Discusses effect of shearing and blanking of sheets and plates upon cutting edge of shear blades and die parts when these sheets and plates are covered with hammer or roll scale, or when intensely hard and abrasive constituent is irregularly but profusely scattered or dispersed through it, e.g., iron silicide in silicon sheet; review of various methods employed to hinder fragmentation of hard crystals and imbed them when fractured so as to avoid and neutralize their grinding effect upon cutting edge; utility of uniformly hard die parts for burrless blanking and shear cutting.

SILK

Artificial. Artificial Silk, T. Brough. Roy. Soc. of Arts—Jl., vol. 75, no. 3864, Dec. 10, 1926, pp. 97–115, 7 figs. Presents details of how silk is produced in order to show resemblance between natural silk and new fiber which is known as artificial silk; discusses four processes in use in production of artificial silk: Chardonnet, Cupra-ammonium, Cellulose Acetate and Viscose.

SLOTTING MACHINES

Rapid. Slot Drilling Machine. Machy. (Lond.), vol. 29, no. 738, Dec. 2, 1926, pp. 272–274, 4 figs. Blundstone rapid slotting machine has been specially designed to enable through slots with round ends to be produced in valve stems and round or other section bars by oscillating end milling cutters operating simultaneously from opposite sides of piece being slotted.

SPECIFIC HEAT

Low Temperatures. Specific Heats at Low Temperatures (Untersuchungen über die spezifischen Wärmen bei tiefen Temperaturen), F. Simon and W. Zeidler. Zeit. für physikalische Chemie, vol. 123, no. 5–6, Oct. 6, 1926, pp. 383–405, 5 figs. Specific heats of sodium, potassium, molybdenum and platinum; deviation of chemical constants of monatomic gases from theoretical values. See brief translated abstract in Brit. Chem. Abstracts, Nov. 1926, p. 1108.

SPEED REDUCERS

Types and Applications. Speed Reducer Types and Their Application to Industrial Requirements. Paper Trade Jl., vol. 84, no. 2, Jan. 13, 1927, pp. 48–52, 17 figs. Deals with different types of speed reducers most suitable and economical for various kinds of industrial service; spur-gear, herringbone-gear, and worm-gear speed reducers; uses and applications.

SPRINGS

Laminated. Laminated Springs. Ry. Engr., vol. 48, no. 564, Jan. 1927, p. 35. Alignment charts for calculation in connection with design of laminated springs.

STANDARDIZATION

Engineering and Industrial. Engineering and Industrial Standardization. Mech. Eng., vol. 49, no. 2, Feb. 1927, pp. 153–159. American Engineering Standards Committee; Bureau of Standards; unification of government specifications; marine standards; standardization in automotive and electrical industry; railway standardization; petroleum industry; American Society for Municipal Improvements; standardization of materials; standards for design, construction and tests; field of mechanical engineering; codes; standardization in War and Navy Dept.; international standardization.

Fits and Tolerances. Fits and Tolerances (Pasninger og Toleranser), L. J. Larssen. Teknisk Ukeblad, vol. 73, no. 44, Nov. 5, 1926, pp. 373–374. Proposed standards for fits and tolerances, limit gages, etc., for machines and tools; advantage of types in quantity production.

Preferred Numbers. Preferred Numbers, A. Herb. Mech. Eng., vol. 49, no. 1, Jan. 1927, pp. 35–36, 2 figs. Standardization based on calculation; application of preferred numbers means simplification; examples; difficulties encountered in introducing preferred numbers through adhering to old methods; preferred numbers generally applicable.

STEAM

High-Pressure. Applications of High-Pressure Steam (Intorno alle applicazioni del vapore ad alta pressione), A. Levi-Cases. Energia Elettrica, vol. 3, no. 11, Nov. 1926, pp. 947–970, 32 figs. Reviews literature; compares results obtained at Langerbrugge, Weymouth, Philo and Borsig-Schmidt plants; high-pressure boilers and turbines; special steam-generator types; Atmos, Göteborg, Orchessleben, Schmidt and other boilers.

Entropy and High Pressure Steam, W. S. Findlay. Power Engr., vol. 22, no. 250, Jan. 1927, pp. 6–7, 1 fig. Consideration of properties of steam with special reference to entropy and high steam pressures.

High-Pressure Steam for Marine Use, O. H. Hartmann. Engineer, vol. 142, no. 3700, Dec. 10, 1926, p. 641. Reviews present position of high-pressure steam practice and indicates in what way experience gained can best be applied to marine practice. Paper read before Schiffbautechnische Gesellschaft, Germany.

Purification. The Purification of Steam. Eng. & Boiler House Rev., vol. 40, no. 6, Dec. 1926, pp. 292 and 295–296, 3 figs. Instructive experiences indicating possibilities of increased economy and efficiency by giving closer attention to question of removing solids carried over in saturated steam.

Superheated. See SUPERHEATED STEAM.

Viscosity Determination. The Karlsruhe Experiment on Viscosity of Steam (L'esperienze di Karlsruhe sulla viscosità del vapor d'acqua), R. Palladino. Revista Marittima, vol. 59, no. 10, Oct. 1926, pp. 71–79, 3 figs. Experimental research and calculations of vicosity of superheated steam at high temperatures; steam passing through capillary of known cross-section and drop in pressure being accurately measured.

STEAM ACCUMULATORS

Haag Type. New Steam Accumulator and Accessories and Rational Steam Production (Nieuwe stoomaccumulator met neventoestellen ten dienste van rationeele stoomproductie), F. C. Huygen. Ingenieur, vol. 41, no. 36, Sept. 4, 1926, pp. 746–750, 3 figs. Steam-accumulator system by Jacobus Haag of Amsterdam, resulting in greater steam production, furnace efficiency and other advantages; steam drying, flue-gas utilization, etc.

Results from. Results from Steam Accumulators, R. L. Fletcher. Gas Age-Rec., vol. 58, no. 26, Dec. 25, 1926, pp. 912 and 918. Review of application of accumulator.

STEAM ENGINES

Back-Pressure. New Governing Methods and Apparatus Applied to Sulzer Back-Pressure Steam Engines. Sulzer Tech. Rev., no. 4, 1926, pp. 14–17, 5 figs. Live-steam make-up valve is automatically operated by steam pressure regulator; pressure transmitter consists of cylindrical cast-iron vessel.

Exhaust Ejectors for. Exhaust Ejectors for Steam Engines, W. Turnwald. Power, vol. 64, no. 26, Dec. 28, 1926, pp. 989–990, 4 figs. Feasibility of using kinetic energy of exhaust to create vacuum is real; success of experiments indicates possibility of lower steam consumption and reduced first cost.

STEAM PIPES

Covering. How Thick Should Pipe Covering Be? C. C. Hermann. Power, vol. 65, no. 2, Jan. 11, 1927, pp. 49–50. Greater thickness give slightly greater heat savings, but there is limit beyond which extra saving will not warrant additional investment.

Heat Losses. The Loss of Heat from the External Surface of a Hot Pipe in Air, E. Griffiths. Engineering, vol. 123, no. 3182, Jan. 7, 1927, pp. 1–4, 15 figs. Describes two electrically heated pipes employed at National Physical Laboratory and shows that results obtained agree fairly closely with each other, with results obtained at low temperatures by steam-condensation method, and also with results previously obtained from 9-in. pipe.

Pressure Drop. Finding the Pressure Drop in Piping, F. C. Evans. Power, vol. 64, no. 25, Dec. 21, 1926, p. 947, 1 fig. Chart designed to assist in making power-plant piping study described by author in Power, Nov. 2, 1926.

Steam-Trap Losses. Losses from Steam Traps (Der Kondenstopf, das Stiefkind des Betriebes). Wärme, vol. 49, no. 40, Oct. 1, 1926, p. 706. Self-emptying traps used to collect and periodically evacuate condensed steam from pipe lines, etc., are often responsible for greater losses of heat and working time than whole network of steam pipes; simple calculation shows how much heat may be wasted by neglecting this part of steam plant.

STEAM POWER PLANTS

Combustion Equipment. Pulverized Coal Equipment Shows Steady Progress. Power Plant Eng., vol. 31, no. 2, Jan. 15, 1927, pp. 106–118, 21 figs. Data on pulverized-coal equipment; progress in stoker design; furnace-wall design; and air heaters.

Developments. How the Steam Power Plant Is Keeping Up-to-Date, C. H. Berry. Eng. News-Rec., vol. 98, no. 2, Jan. 13, 1927, pp. 88–91, 4 figs. Steam the dominant medium for power generation; major steam-plant losses and methods of attacking them; industrial-plant economy secured by combining power and heating requirements.

Industrial. National Lock Company Installs Two Extraction Type Turbines. Power Plant Eng., vol. 31, no. 2, Jan. 15, 1927, pp. 98–104, 13 figs. Features of new plant at Rockford, Ill., include cooling tower, gravity ash-handling system, water softener and compact arrangement of auxiliaries and piping.

Power and Heating. An Up-to-Date High Back-Pressure Power and Heating Plant, G. B. Pattison. Power, vol. 64, no. 25, Dec. 21, 1926, pp. 934–937, 6 figs. In Detroit plant of Frederick Stearns & Co., a new power plant has been completed, equipped with turbine-driven electric generators receiving steam at 250 lb. per sq. in. gage and exhausting at 40 lb. gage to factory service lines; ample room and daylight, even in basement, show value of attention to operating convenience on part of plant designer; provision for burning factory wastes reduces handling costs.

STEAM TURBINES

Back-Pressure. Use of Steam Turbines Where Steam Is Employed in Manufacturing Processes (Empleo de turbinas de vapor en industrias que necesitan vapor de calefacción en los procesos de fabricación), A. Fischer. Ingenieria Y Construccion, vol. 4, no. 46, Oct. 1926, pp. 433–443, 13 figs. Application in textile, paper, sugar and other mills; advantages of combination of steam production for electric power and for manufacturing processes; efficacy of back-pressure turbines.

Blade Materials. Turbine Blade Materials. Elecn., vol. 97, no. 2531, Dec. 3, 1926, pp. 645–646, 2 figs. Notes on their development; effect of modern steam conditions; causes of deterioration.

Developments. Analysis of Present-Day Turbine Installations. Power Plant Eng., vol. 31, no. 1, Jan. 1, 1927, pp. 42–45, 2 figs. Comments on pressures and temperatures employed, use of reheat, turbine arrangement and extraction for feedwater heating.

Bigger and Better Turbines Ahead, A. G. Christie. Power Plant Eng., vol. 31, no. 1, Jan. 1, 1927, pp. 40–42, 1 fig. Developments show trend toward higher pressures and temperatures, reheat and extraction.

Developments in Steam Turbine Construction. Power Plant Eng., vol. 31, no. 2, Jan. 15, 1927, pp. 138–143, 11 figs. Presents statements by different manufacturers.

80,000-Kw. Further Details of Hudson Avenue 80,000-Kilowatt Turbine Unit. Power, vol. 65, no. 2, Jan. 11, 1927, pp. 52–54, 6 figs. Provisions for thermal expansion of casings and rotors; rapid governor action secured through double relay control; shaft seals and thrust bearing.

80,000-Kilowatt Turbine Unit. Power, vol. 64, no. 22, Nov. 30, 1926, pp. 815–818, 4 figs. General design features of new two-cylinder unit at Hudson Ave. station of Brooklyn Edison Co.; low-pressure exhaust design to reduce losses.

European Design. What Europe Is Doing In Steam Turbine Design. Power, vol. 65, no. 3, Jan. 18, 1927, pp. 89–91, 5 figs. Article based on lecture delivered at Harvard University by E. A. Kraft, Berlin, Germany. Shortage of fuel dictates designs for maximum economy; four turbine cylinders are provided in 85,000-kw. turbine generator now under construction; there is strong demand for industrial turbines and geared sets.

50,000-Kw. Third Unit for Waukegan 50,000 Kilowatts. Power, vol. 64, no. 25, Dec. 21, 1926, pp. 942–943, 4 figs. New unit is to have single 1800-r.p.m. generator with directly connected exciter driven by tandem-compound turbine with single-flow high-pressure cylinder made of steel and cast-iron low-pressure cylinder arranged for double flow; blading is of reaction type throughout and of nickel chrome steel or Monel metal.

Modern. Modern Steam Turbines (Neuzeitliche Dampfturbinen des In- und Auslandes), M. Knörlein. Wärme, vol. 49, no. 34, Aug. 20, 1926, pp. 597–604, 19 figs. Present means for obtaining efficiency; details of types by various firms; high-pressure turbine; foreign types; comparison of German and American large central stations.

Progress, 1926. Progress in Steam Turbines. Power, vol. 65, no. 1, Jan. 4, 1927, pp. 18–22, 8 figs. Great increase in size of units; live-steam reheaters introduced; small turbines improved; wide use of bleeding and high-back-pressure turbines to combine power heating and process; condensers of improved design and less surface.

STEEL

Alloy. See ALLOY STEELS.

Austenitic Structure. The Decomposition of the Austenitic Structure in Steel, R. L. Dowdell and O. E. Harder. Am. Soc. Steel Treating—Trans., vol. 11, no. 1, Jan. 1927, pp. 17–41, 1 fig. Summary of work done by previous investigators; effect of quenching on austenitic structure, of tempering on decomposition and of stress on austenitic decomposition during quenching.

Boiler. Basic Steel. Metallurgist (Supp. to Engineer, vol. 142, no. 3703), Dec. 31, 1926, pp. 178–179. Discusses problem of cracking in boiler plates; points out that basic steel has been much more widely used in Germany and America than in England; unsound steel, by whatever process it is produced, is highly undesirable for boiler-plate purposes; while basic steel is more usually produced of "rimming" variety, this can scarcely be inherent defect of basic process, but must be regarded as result of particular type of practice.

The Behavior of Boiler Materials in Operation (Das Verhalten der Kesselbaustoffe im Betrieb), Fry. Kruppsche Monatshefte, vol. 7, Nov. 1926, pp. 185–196, 31 figs. Requirements of boiler materials and how they are met by present quality of low-carbon steel; causes of poor behavior of steel; effect of aging,

and means of reducing damages due to aging; describes new unalloyed low-carbon steel which meets all requirements of good boiler steel, especially with regard to strength and weldability and which, in addition, does not become brittle even with 10 per cent cold deformation and subsequent annealing; results of tests.

Chrome. See CHROME STEEL.

Constitution. The Constitution of Steel and Cast Iron, F. T. Sisco. Am. Soc. Steel Treating—Trans., vol. 11, no. 1, Jan. 1927, pp. 115–128, 9 figs. Effect of various elements other than carbon added to or present as impurities in normal carbon steels; these elements found in practically all carbon steels are manganese, silicon, sulphur and phosphorus; in addition most steels contain traces and occasionally appreciable amounts of foreign matter such as slag and other nonmetallic inclusions and gas; effect of common elements and more prominent impurities on structure and physical properties of carbon steels.

Corrosion. Effect of Velocity on Corrosion of Steel Under Water, R. P. Russell, E. L. Chappell and A. White. Indus. & Eng. Chem., vol. 19, no. 1, Jan. 1927, pp. 65–68, 5 figs. Presents data showing that when cleaned or polished steel is corroded under water for short periods, corrosion may be high at low velocities and becomes less with further increases in velocity; when steel is rusted previously, however, corrosion at high velocities is greater than corrosion observed at very low velocities; in other words, presence of rust film greatly alters corrosion rate.

Corrosion by Lubricating Oils. The Corrosion of Steel by Lubricating Oils Containing Small Amounts of Moisture and Alkalies, W. Singleton. Indus. Chemist, vol. 11, no. 23, Dec. 1926, pp. 540–549, 36 figs. Investigation by author of corrosion produced by high-grade lubricating oils upon steel, particularly in presence of small amounts of alkali salts; such conditions are liable to arise in connection with operation of steam turbines.

Die. Selection of Die Steel (Einge Richtlinien für die geeignete Auswahl von Gesenkstahl), W. Oertel. Maschinenbau, vol. 5, no. 19, Oct. 7, 1926, pp. 878–880, 4 figs. From tests it appears that tungsten steels and high-chromium steels offer best combination of properties; 0.6 to 0.7 per cent carbon steel with 0.6 to 8 per cent Mn has been used but meets requirements only for not very severe conditions.

Non-Metallic Inclusions. Identifying Nonmetallic Inclusions in Iron and Steel, W. Campbell and G. F. Comstock. Foundry, vol. 55, no. 1, Jan. 1, 1927, supp. plate. Foundry data sheet. Determination of inclusions in steel.

Normal and Abnormal. Progress in Study of Normal and Abnormal Steel, S. Epstein and H. S. Rowdon. Am. Soc. for Steel Treating—Preprint, no. 6, for mtg. Jan. 20–21, 1927, 41 pp., 21 figs. Defines meaning of terms, normal and abnormal steel, and illustrates characteristics of normal and abnormal structure in carburizing and tool steel; under certain quenching conditions abnormal steel is more prone to give soft spots than normal steel, but with drastic quenching in brine or in sodium-hydroxide solution, it is possible to completely prevent formation of soft spots in both normal and abnormal steel; it is shown that normality and abnormality have their origin in deoxidation procedure of steel making and that in particular additions of aluminum and ferrovanadium in mold produced abnormality.

Normality. Normality of Steel, J. D. Gat. Am. Soc. for Steel Treating—Preprint, no. 7, for mtg. Jan. 20–21, 1927, 43 pp., 28 figs. After conducting experiments to demonstrate behavior of steels having different grain size and amounts of segregated cementite, author dwells on properties of "cementitic lining" present in abnormal steels, arriving at conclusions that resistance to uniform hardening is caused by high oxygen content forming eutectoid alloy with constituents of austenite.

Properties. Effect of Gas on Properties of Steel (Influence des gaz sur les propriétés des aciers), L. Guillet and A. Roux. Académie des Sciences—Comptes Rendus, vol. 183, no. 18, Nov. 3, 1926, pp. 717–719. Compares mechanical properties of steels after annealing in air and in vacuum; shows among other things that steel annealed in vacuum has finer crystalline structure than if annealed in air.

Tool. See TOOL STEEL.

STEEL CASTINGS

Capacity and Production. High Capacity in Steel Castings. Iron Age, vol. 119, no. 1, Jan. 6, 1927, pp. 72–73, 6 figs. Presents tables showing capacity, 1925 production and percentage of capacity represented by production for five leading types of casting plants: acid open-hearth, basic open-hearth, electric, converter and crucible; six diagrams show history of production of steel castings over past quarter-century; specific classes of castings.

STEEL, HEAT TREATMENT OF

Metallography and. Heat Treatment and Metallography of Steel—A Practical Course in the Elements of Physical Metallurgy, H. C. Knerr. Forging—Stamping—Heat Treating, vol. 12, nos. 1, 2, 3, 4, 6, 8, 9, 10, 11 and 12, Jan., Feb., Mar., Apr., June, Aug., Sept., Oct., Nov. and Dec. 1926, pp. 9–14, 52–56, 99–104, 127–131, 212–219, 275–279 and 283; 339–343, 392–397, 428–432 and 451–455, 74 figs. Jan.: Carburizing and casehardening. Feb.: Effects of alloying elements. Mar. and Apr.: Special alloying elements. June: Chromium-vanadium and nickel-chromium steels. Aug.: Manganese. Sept: Silicon and molybdenum. Oct.: High-speed steel, composition, metallography and theory of hardening; heat treatment. Nov.: Equipment used in heat treatment. Dec.: Furnaces for heat treatment.

Oil-Hardening Steel. Heat-Treatment of Oil-Hardening Steel, A. Mumper. Forging—Stamping—Heat Treating, vol. 13, no. 1, Jan. 1927, pp. 9–11, 5 figs. Deals with heat treatment of oil-hardening tool steel for blanking and stamping dies.

Tempering. Tempering Plain Carbon Tool Steels, V. E. Hillman. Forging—Stamping—Heat Treating, vol. 12, no. 12, Dec. 1926, pp. 444–446 and 450, 3 figs. Results of investigation into effect of prolonged heating in tempering plain carbon steels; drawing mediums and furnace tempering.

STEEL MANUFACTURE

Research. Fundamental Research in Steel Manufacture, C. H. Herty, Jr. Am. Soc. for Steel Treating—Preprint, no. 5, for mtg. Jan. 20–21, 1927, 14 pp., 5 figs. Classifies problems encountered in making of steel and points out that field for fundamental research in its manufacture is astounding in its magnitude and intricacies; consideration of fundamental research which deals primarily with slag-metal reactions giving particular attention to formation and elimination of non-metallic inclusions formed from manganese, silicon and aluminum.

Roller Bearings. Bearings Require Clean Steel, J. D. Knox. Iron Trade Rev., vol. 79, nos. 26 and 27, Dec. 23 and 30, 1926, pp. 1622–1624 and 1628 and 1675–1679, 17 figs. In plant of Timken Roller Bearing Co., Canton, O., all raw materials charged into electric furnaces are of selected grades; chips and turnings are pressed into briquettes; care is exercised in preparing ingot molds and in pouring metal; ingots converted into blooms by 3-high mill in control of one operator; seamless mill produces stock for cones and cups.

STOKERS

Design. The New Function of Stokers for Bituminous Coal and Aspects Governing Their Further Development, J. Haack. Archiv für Wärmewirtschaft, vol. 7, no. 12, Dec. 1926, pp. 337–344, 26 figs. Constructive details of modern stokers; size of combustion chamber; types of grates for large boilers; inclined grates; means of increasing efficiency; stoker vs. pulverized-coal equipment.

Improvements. Stoker Improvements Meet High Ratings. Power Plant Eng., vol. 31, no. 1, Jan. 1, 1927, pp. 17–20, 2 figs. Furnace designs limit stoker capacity; water walls, radiant superheaters and preheated air are reducing furnace sizes.

SUPERHEATED STEAM

Conversion into Superpressures. Direct Conversion of Low-Pressure Superheats into Super-Pressures. Engineer, vol. 142, no. 3703, Dec. 31, 1926, pp. 718–719. Describes Perkins process first patented in 1827.

Valves for. A New Superheated Steam Valve for High Pressures. Eng. Progress, vol. 7, no. 12, Dec. 1926, p. 321, 2 figs. Manufactured by firm of Dingler A. G. in Zweibrücken; even very large valves of this type can be opened and closed by hand; pressure compensation inside of valve is achieved by means of two guide rods.

SUPERHEATERS

Developments. Higher Superheats Demand Many Changes. Power Plant Eng., vol. 31, no. 1, Jan. 1, 1927, pp. 38–39, 3 figs. Increased superheats and changed boiler practice make necessary application of new types and other changes to give desired result.

T

TERMINALS, RAILWAY

London. The Remodelling of Charing Cross and Cannon-Street Stations, G. Ellson. Engineering, vol. 122, no. 3178, Dec. 10, 1926, pp. 721–722. Remodeling of these two terminals was mainly due to necessity for longer platforms and for providing for working of electric instead of steam trains. (Abstract.) Paper read before Instn. Civ. Engrs.

TESTING MACHINES

Alternating-Stress. Electro-Magnetic Alternating-Stress Testing Machine. Engineering, vol. 122, no. 3178, Dec. 10, 1926, pp. 722–724, 3 figs. Machine for carrying out alternating tensile and compression tests at rate of 500 cycles per second, so that complete tests can be carried out in few hours; machine also enables fatigue limit to be determined approximately in few minutes; made by C. Schenck, Darmstadt.

TESTS AND TESTING

Materials. Selecting Materials for Service, F. E. Schmitt. Am. Soc. Steel Treating—Trans., vol. 11, no. 1, Jan. 1927, pp. 42–53. Primary trouble is that testing engineer usually measures conventionalized properties, whose correlation with daily service demands is largely unknown; therefore, tests of suitability for desired service should be developed in place of or to supplement present conventionalized tests; in such development of suitability tests, users of materials have excellent opportunity to assist.

TEXTILE MILLS

Scrap Yards. The Textile Mill Scrap Yard. Textile World, vol. 71, no. 1, Jan. 1, 1927, pp. 47–49, 2 figs. Replacing obsolete machinery with modern equipment; why mechanical wastes should be watched and regulated as closely as purely textile wastes; plan of systematized scrap yard; interrelation of second-hand machinery department and scrap yard.

TIDAL POWER

Utilization. Power from the Tides, E. L. Fleming Engineer, vol. 142, no. 3701, Dec. 17, 1926, p. 661. Discussion of project for development of cheap electrical power from tides in estuary of river Exe.

TIME STUDY

Rolling Mills. See ROLLING MILLS.

Standardization of Data. Standardizing Time Study Data, A. M. Lindsley. Indus. Mgmt. (N. Y.), vol. 73, no. 1, Jan. 1927, pp. 33–40, 16 figs. How time study can be used to cut costs in moderate size plant.

TOOL STEEL

Failures. Tool Steel Failures—Their Causes and Cures, F. B. Lounsberry. Am. Soc. Steel Treating—Trans., vol. 11, no. 1, Jan. 1927, pp. 101–114, 31 figs. Various factors which assist toolmaker in selection of steels and in attainment of greatest possible service from manufactured tools; statements are based on data obtained in investigation of from 400 to 500 complaints per year, extending over period of years; 55 per cent of complaints are due to faults at mill and of these about one-half are due to faulty inspection; author believes that closer control in melting operations will eliminate much of trouble; electric furnace is valuable aid in this respect; accurate temperature control is imperative.

TRACTORS

Industrial and Farm. Industrial and Agricultural Tractors (Motorschlepper für Industrie und Landwirtschaft), G. Becker. Motorwagen, vol. 29, no. 25, Sept. 10, 1926, pp. 583–595, 19 figs. Results of author's investigations of American tractors; tractive efforts of different types for field and for road; wheel and caterpillar tractors; types of drives; running speed of tractors in the field and on roads; energy losses in gears; types of engines employed; fuel consumption.

V

VISCOSIMETERS

Oil Measurement. Simple Viscosimeter With Scale (Ein neues einfaches Skalenvikosimeter), R. v. Dallwitz-Wegner. Petroleum, vol. 22, no. 28, Oct. 1, 1926, pp. 1048–1049, 1 fig. Worm rotating at constant speed in cylindrical chamber, heated to desired temperature and containing oil under test, causes oil to rise in vertical glass tube, with scale, to height depending on viscosity of oil; scale can be divided in any of usual units.

W

WAGES

Elm Orlu System. The Elm Orlu Contract System, E. H. Parker. Min. & Met., vol. 8, no. 241, Jan. 1927, pp. 16–20, 5 figs. Method of wage payment based on unit prices for work done; system of recording work done.

WELDING

Electric. See ELECTRIC WELDING, ARC.

Gaseous Atmosphere. Welding in a Gaseous Atmosphere. Am. Welding Soc.—Jl., vol. 5, no. 12, Dec. 1926, pp. 43–49. Discussion at meeting of Society in Buffalo.

Machinery Bases. Designing a Welded Steel Machinery Base, R. E. Kinkead. Machy. (N. Y.), vol. 33, no. 5, Jan. 1927, pp. 377–379, 4 figs. Redesigning of cast-iron machinery bases in order to substitute welded steel.

Oxyacetylene. See OXYACETYLENE WELDING.

Steel Foundry. The Selection of a Welding Process, L. E. Everett. Acetylene Jl., vol. 28, no. 6, Dec. 1926, pp. 277–279. Conditions leading to selection of welding process in steel foundry, whose production is confined largely to straight carbon-steel castings.

WIRE

Cold Working. The Influence of Cold Working on the Physical Properties of Wire, A. J. Michel. Wire, vol. 2, no. 1, Jan. 1927, pp. 10–13 and 28, 4 figs. Shows that aging has same influence upon physical properties after cold working has been completed, as cold working of wire will normally have by itself.

WOOD

Machine for Bending. A Roof-Stick Bending Machine. Engineer, vol. 142, no. 3701, Dec. 17, 1926, p. 672, 1 fig. Machine devised for bending roof sticks of railway coaches and similar operations, manufactured by J. A. Fay and Egan Co. in America.

Tropical Hardwoods. Tropical Hardwoods with Special Reference to Their Use in American Industries, G. P. Ahern. Mech. Eng., vol. 49, no. 1, Jan. 1927, pp. 42–45. Outline of problems and details of program of work for A.S.M.E. special research committee on substitute species for domestic woods.

WOOL

Chlorination. The Chlorination of Wool, J. B. Speakman and A. C. Goodings. Textile Inst.—Jl., vol. 17, no. 12, Dec. 1926, pp. T607–T614, 2 figs. Investigation of cause of unshrinkability and amount of chlorine necessary to produce this condition.

Drawing and Spinning. Modern Ideas in Worsted Drawing and Spinning, S. Kershaw. Textile World, vol. 71, no. 2, Jan. 8, 1927, pp. 23–24. Summary of conclusions drawn from recent investigations of French system as compared with Bradford; twist in roving and yarn; cause and prevention of neps, slubs, irregularity and double yarn; and possibilities of adopting certain methods employed in cotton manufacture.

THE ENGINEERING INDEX

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Mechanical Engineering Section

THE ENGINEERING INDEX presents each month, in conveniently classified form, items descriptive of the articles appearing in the current issues of the world's engineering and scientific press of particular interest to mechanical engineers. At the end of the year the monthly instalments are combined along with items dealing with civil, electrical, mining and other branches of engineering, and published in book form, this annual volume having regularly appeared since 1906. In the preparation of the Index by the engineering staff of The American Society of Mechanical Engineers some 1200 technical publications received by the Engineering Societies Library (New York) are regularly reviewed, thus bringing the great resources of that library to the entire engineering profession.

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ACCELEROMETERS

Rotating Machinery. A Recording Accelerometer for Rotating Machinery, H. W. Bousman. Mich. Technic, vol. 40, no. 2, Jan. 1927, pp. 20–21 and 32, 2 figs. Discusses its applications to synchronous machines, automotive testing and deceleration tests of generators.

ACCIDENTS

Industrial. Incidental Cost of Industrial Accidents Is Four Times the Direct Loss, H. W. Heinrich. Mfg. Industries, vol. 13, no. 1, Jan. 1927, pp. 49–52. Points out that incidental costs which are paid directly by employer are four times total cost represented by compensation and liability claims and medical treatment; this conclusion comes from analysis of 5000 specific accident reports; among incidental costs are lost time of adjacent employees, lost time of supervisors; injury to equipment; interference with production, loss of profit on lost output of injured employees.

Psychological Study. A Psychological Study of Individual Differences in Accident Rates, E. Farmer and E. G. Chambers. Indus. Fatigue Research Board—Report, no. 38, 1926, 45 pp., 6 figs. Problem to be investigated resolves itself into two questions: (1) do individuals in fact differ in their individual susceptibility, so that under equal conditions of risk some will incur accidents while others will escape, and (2) if this is so, in what measurable respects do such susceptible individuals differ from their fellows? Present report embodies result of first step towards answer to second question; methods adopted has been to apply selected psychological tests to large number of workers in different occupations and to compare results of tests with accident records of subjects examined.

ADHESIVES

Chemical Compounds. Adhesives and Adhesion: True Chemical Compounds as Adhesives, J. W. McBain and W. B. Lee. Royal Soc.—Proc., vol. 113, no. A 765, Jan. 1, 1927, pp. 606–620, 2 figs. Results of experiments made with solids and liquids of very diverse types; it is shown that pure crystalline substances fully rival well-known adhesives in strength of joint obtainable by them, and yield joints between optically polished metal surfaces whose breaking strength may approach one ton per sq. in.; pure liquids give results of lower order of magnitude, even when they are only few millionths of inch thick, in all cases the thinner the film, the stronger the joint; good lubricants with high spreading coefficients are poor adhesives.

AIR COMPRESSORS

Testing. The Testing of Air Compressors, J. N. Williamson. Iron & Coal Trades Rev., vol. 114, 3072 and 3073, Jan. 14 and 21, 1927, pp. 46–47, and 102–103, 9 figs. Special reference to measurement of volume compressed; relative importance of various compressor efficiencies; value of air-compressor indicator cards.

AIR CONDITIONING

Dehumidification. Dehumidification Methods, M. C. W. Tomlinson. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 33, no. 2, Feb. 1927, pp. 87–94, 7 figs. Reviews various methods and phases of dehumidification and points out, specifically, interesting method which has been neglected but which offers considerable advantage, especially to those who must work at low dew points and relative humidities.

Refrigeration Applied to. Refrigeration as Applied to Air Conditioning, A. Lewis. Heat. & Vent. Mag., vol. 24, no. 1, Jan. 1927, pp. 80–86, 9 figs. Australian practice as compared to usual American methods with hygrometric chart from American and Indian sources.

AIRPLANE ENGINES

Beardmore. The Beardmore "Typhoon" Mark I, Engine. Flight, vol. 19, no. 4, Jan. 27, 1927, pp. 44–45, 3 figs. 6-cylinder, 800-hp. engine with speed of 1350 r.p.m.

Carburetors. See CARBURETORS.

Inverted. The First British Inverted Engine. Aeroplane, vol. 32, no. 4, Jan. 26, 1927, pp. 100–102, 4 figs. Typhoon is inverted edition of Beardmore cyclone engine; salient features are that it develops between 800 and 900 hp. at approximately 1300 r.p.m., from 6 cylinders arranged in straight line.

AIRPLANE PROPELLERS

Thrust Distribution and Efficiency. The Numerical Determination of Thrust Distribution and Efficiency of Airplane Propellers under Any Given Operating Conditions (Die rechnerische Ermittlung der Schubverteilung und des Wirkungsgrades für ausgeführte Luftschrauben bei beliebigen Betriebszuständen), T. Bienen. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 17, no. 22, Nov. 27, 1926, pp. 485–487, 2 figs. Method of determining distribution of thrust and moments, efficiency and power required.

AIRPLANES

Air-Cooled. Air-Cooled Airplane Engines (Luftgekühlte Flugmotoren), Fischer. Luftfahrt, vol. 30, no. 22, Nov. 20, 1926, pp. 341–343, 8 figs. Disadvantage of water cooling consists in its comparatively complicated, extensive and heavy construction; difficulty with air cooling lies in fact that it is very difficult to obtain absolutely uniform cooling of all cylinders, and to effect intensive cooling required by cylinder head; air-cooled radial and tandem engines.

Air-King. The Air-King Four-Passenger Plane. Aviation, vol. 22, no. 4, Jan. 24, 1927, pp. 178–179, 2 figs. New low-powered commercial or private touring airplane equipped with Curtiss OX-5 engine; manufactured by National Airways System, Lomax, Ill.

Airfoils. The Modern Theory of Aerofoils and its Application to Aeroplane Design. Instn. Aeronautical Engrs.—Proc., no. 20, 1926, pp. 38–62 and (discussion) 63–64, 7 figs. Methods of using vortex theory in its practical applications; application to practical purposes; application of reduced-section characteristics.

Wind Tunnel Test of Clark "Y"-Clark "Y-15"-Clark "Y-18"-Clark "Y-21"-Göttingen 398 and S. T. Ae'-27a, 6" x 36" Airfoils. Air Corps Information Cir., vol. 6, no. 573, Oct. 4, 1926, 24 pp., 10 figs. Test to determine aerodynamic characteristics of airfoils; airfoil sections were 6 by 36 in., and all with one exception were made of metal; they were tested in 5-ft. tunnel on wire balance at 40 to 140 mi. per hr.; lift, drag, and pitching moments were measured and center of pressure determined for each section.

Ambulance. Ambulance Airplanes (Sanitätsflugzeuge), W. Siebenhüner. Luftfahrt, vol. 31, no. 31, no. 1, Jan. 5, 1927, pp. 5–8, 6 figs. Requirements of ambulance planes; describes types by Junkers, Dornier, Bréguet, Hanriot and Fairey.

Autogiro. Testing a Windmill Airplane ("Autogiro") (Untersuchung eines Windradflugzeugs), R. Seiferth. Zeit. für Flugtechnik. u. Motorluftschiffahrt, vol. 17, no. 22, Nov. 27, 1926, pp. 483–485, 4 figs.; also translation in Nat. Advisory Committee for Aeronautics—Tech. Memorandum, no. 394, Jan. 1927, 9 pp., 4 figs. Some doubt has been expressed regarding dependability of wonderful possibilities of de la Cierva's flying windmill based on certain Spanish tests; it was found that lift coefficient had been erroneously applied to total wing single, which really is one wing; tests now undertaken at Göttingen reduce potentiality of new device considerably; this new kind of aircraft, in spite of its high power requirement, will doubtless serve many special purposes, on account of its low landing speed, easy controllability and insensitivity to gusts; it is also possible that, through change in shape of wings, a little further improvement can yet be attained in its flight performances, but essential points have probably been covered by these researches.

Climbing Efficiency. Climbing Efficiency of Aircraft, C. C. Walker. Flight (Aircraft Engr.), vol. 19, no. 4, Jan. 27, 1927, pp. 46a–46e, 5 figs. Rate of climb at ground level is of obvious and vital importance in bombers and commercial machines, but less so for types which possess great margin of power and have to develop their qualities at heights.

DeHavilland. The 1927 Model "Moth." Flight, vol. 19, no. 4, Jan. 27, 1927, pp. 47–48, 3 figs. Fitted with new "Cirrus" Mark II engine; top speed, 98 m.p.h.; rate of climb at ground level 625 ft. per min.; ceiling 15,000 ft.

Dycer. The Dycer Sportplane. Aviation, vol. 22, no. 6, Feb. 7, 1927, pp. 283–284, 2 figs. Machine is 3-place plane, powered with Curtis OX-5 engine; when tested, speed of 90 m.p.h. was obtained and plane demonstrated unusual maneuverability and ease of handling.

Dyle and Bacalan. Dyle and Bacalan Airplane D.B. 10, Type Bn4 (L'Avion Dyle et Bacalan, D.B. 10, type Bn4). Aérophile, vol. 34, nos. 21–22, Nov. 1–15, 1926, pp. 326–329, 4 figs. All-metal 2-engine monoplane intended for night bombing; it can carry weight of 1300 kg. and has radius action of 1000 km.

Flying Boats. See FLYING BOATS.

Heinkel. New Heinkel Airplanes (Neue Heinkel-Flugzeuge). Luftfahrt, vol. 30, no. 20, Oct. 20, 1926 pp. 314–15, 5 figs. Details of training and express biplane, Type H.D. 22, and new 2-engine plane, H.D. 20.

The Heinkel HD–20 Observation Plane. Aviation, vol. 22, no. 6, Feb. 7, 1927, pp. 276–277, 3 figs. German twin-engine military or commercial machine with Whirlwind engines.

Hess. The Hess Blue Bird. Aviation, vol. 22, no. 5, Jan. 31, 1927, pp. 228–229, 2 figs. Small three-place sport commercial plane with OX-5 engine.

Metal. A Czechoslovak All-Metal Two-Seater. Flight, vol. 19, no. 2, Jan. 13, 1927, pp. 18–20, 8 figs. Vojenska-Smolik 16 is long-distance reconnaissance biplane with 450-hp. Lorraine-Dietrich engine.

Performance Testing. Airplane Performance Testing, P. H. Stanley. Purdue Eng. Rev., vol. 22, no. 2, Jan. 1927, pp. 5–6 and 32. System of quantitative tests run at McCook Field.

Performance Testing and Analysis, R. S. Capon. Royal Aeronautical Soc.—Jl., vol. 31, no. 194, Feb. 1927, pp. 102–126 and (discussion) 127–132, 13 figs. Modifications made in methods of measurement and

Note.—The abbreviations used in Indexing are as follows:
Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

reduction to standard atmosphere at Air Force testing station at Martelsham; outlines form of analysis at present in use by research section which came into being at that station 18 months ago; indicates air tests, very different from present standard system, which best meet requirements of that analysis.

Quantity Production. Continuity in Airplane Production (Fliessarbeit im Flugzeugbau), C. Brilmayer. Motorwagen, vol. 29, no. 33, Nov. 30, 1926, pp. 817–818, 1 fig. Quantity production has hitherto been possible only in connection with military planes, since commercial types have not been sufficiently standardized; in France are to be found beginnings of quantity production which have been made possible by introduction of metal as building material; firm of Breguet has made large use of duralumin parts; production has reached three planes per day; it was found possible to introduce quantity principles into production of ribs, and in assembling of wings and bodies.

Seaplanes. See SEAPLANES.

Struts. Strength of Bent Struts, J. E. Younger. Air Corps Information Cir., vol. 6, no. 580, Dec. 1, 1926, 5 pp., 2 figs. Develops formula for determining strength of long strut when it is initially bowed.

Take-Off and Landing. A Comparison of the Take-Off and Landing Characteristics of a Number of Service Airplanes, T. Carroll. Nat. Advisory Committee for Aeronautics—Report, no. 249, 1927, 12, 18 figs. Information regarding distance run and ground speed for various airplanes during two maneuvers.

Three-Engined. The Cost of Operating 3-Engine Planes, C. G. Peterson and R. B. C. Noorduyn. Aviation, vol. 22, no. 5, Jan. 31, 1927, pp. 222–223. Discusses costs of running air transportation, based on experience of Philadelphia Rapid Transit Air Service in operating Washington-Norfolk route.

ALLOYS

Aluminum. See ALUMINUM ALLOYS.

Brass. See BRASS.

Copper. See COPPER ALLOYS.

Light. Light Alloys. Metallurgist (Supp. to Engineer), Jan. 28, 1927, pp. 1–2. Review of progress in aluminum and magnesium alloys; in regard to production of aluminum there has been only one striking forward step, development of method of refining aluminum by fusion electrolysis; development of pre-solidification processes; properties of beryllium.

Magnesium. See MAGNESIUM ALLOYS.

ALUMINUM

Anodic Oxidation. The Protection of Aluminum from Corrosion. Metallurgist (Supp. to Engr.) Jan. 28, 1927, pp. 7–8. Discusses process of anodic oxidation of aluminum or its alloys; properties of anodically produced film are said to be remarkable; anodic oxidation is readily applicable to pure aluminum and to those alloys which do not contain too much copper.

Castings. Impregnating Aluminum Castings with Silicate of Soda. Metal Industry (Lond.), vol. 30, no. 4, Jan. 28, 1927, pp. 109–110, 1 fig. Successful method of treating aluminum castings for porosity if used on gasoline or oil lines by use of silicate of soda; apparatus is composed primarily of two steel cylindrical shaped bottles, one known as impregnating bottle, other as feeder bottle.

Aluminum and Its Alloys, H. W. Clarke. Metal Industry (Lond.), vol. 30, no. 1, Jan. 7, 1927, pp. 21–23. Intensive recent research in aluminum; cast alloys of aluminum; duralumin type of alloys; wrought aluminum alloys; duralumin in aircraft construction.

ALUMINUM ALLOYS

Aluminum Bronze. See ALUMINUM BRONZE.

Aluminum-Copper. Light Aluminum Copper Alloys. Foundry Trade Jl., vol. 35, no. 544, Jan. 20, 1927, p. 54. Methods of making up 92:8 aluminum-copper alloy in foundries for casting purposes; defects; proportion of aluminum alloys in demand for other castings, such as aluminum-magnesium, aluminum-zinc, aluminum-copper-tin, or aluminum-copper-manganese, is small compared with that for castings of 92 per cent aluminum and 8 per cent copper alloy.

Aluminum-Germanium. Alloys of Aluminum with Germanium (Das Diagram Germanium-Aluminum), W. Kroll, Metall u. Erz, vol. 23, no. 24, Dec. 2, 1926, pp. 682–685, 4 figs. Contains two articles on investigation of alloys of germanium with aluminum, and also replacement of silicon by germanium in alloys of duralumin type; presents equilibrium diagram of aluminum-germanium system, which is simple eutectiferous one, closely resembling silicon-aluminum series; melting point of eutectic is 233 deg. cent. below melting point of aluminum; it may prove useful as solder; study of Brinell hardness of alloys, showing that germanium hardens aluminum much more rapidly than does silicon; in alloys of duralumin type, germanium can replace silicon in formation of silicide which confers age-hardening properties on resulting alloys; small additions of germanium improve alloys of duralumin, lautal and aludur types. See translated abstract in Metallurgist (Supp. to Engr.), Jan. 28, 1927, pp. 6–7.

Aluminum-Manganese. Equilibrium Relations in Aluminum-Manganese Alloys of High Purity, E. H. Dix, Jr., and W. D. Keith. Am. Inst. Min. & Met. Engrs.—Trans. no. 1633-E, Feb. 1927, 19 pp., 12 figs. Explanation of phenomenon encountered in aluminum-manganese system, namely, that undercooling during chill-casting has produced extremely fine eutectic structure so that no evidence of finely divided particles of two phases can be obtained microscopically in chill-cast specimen; this is supported by fact that hypo-eutectic alloys on annealing only show particles in areas commonly forming eutectic network; that this is very unusual system is shown by fact that alloys cooled slowly at rate of approximately 100 deg. cent. per hr.

Aluminum-Silicon. Aluminum-Silicon Alloys. Metallurgist (Supp. to Engr.), Jan. 28, 1927, pp. 8–14, 12 figs. Review of three papers dealing with constitution, structure and properties of these alloys, namely, by Gwyer and Phillips with appendix by Stockdale, by Grogan and by Otani, respectively; also review of investigation by Petit, published in Revue de Métallurgie.

Atmospheric Exposure, Effect of. The Corrosion Products and Mechanical Properties of Certain Light Aluminum Alloys as Affected by Atmospheric Exposure, E. Wilson. Phys. Soc.—Proc., vol. 39, no. 216, Dec. 15, 1926, pp. 15–25, 3 figs. Experiments made on electrical conductivities, corrosion products and tensile properties of high-purity aluminum and certain light aluminum alloys, which have been exposed to London atmosphere for period of 24 years; elements concerned are copper, nickel, manganese and zinc in varying amounts up to few per cent; includes note on corrosion products of high-conductivity copper.

Casting. Still Casting of Metals, P. H. G. Durville. Am. Inst. Min. & Met. Engrs.—Trans., no. 1651-E, Feb. 1927, 6 pp. Pure aluminum, or alloy containing small proportion of aluminum, can be melted without flux except for layer of charcoal, because film of aluminum oxide and metal forms at surface of melted aluminum; although very thin, this film is air-proof, and it prevents metal underneath from oxidizing; this oxidized film does not move easily on account of its toughness and high surface tension; "still casting" as exemplified in two methods, permits of production without great expense and trouble, of alloys containing aluminum.

Castings. Light Alloy Castings in Marine Engineering, G. Mortimer. Metallurgist (Supp. to Engineer), Jan. 28, 1927, pp. 2–6, 4 figs. Early experiences with aluminum alloys; development of silicon alloys, and their properties; specifications of Brit. Eng. Standards Assn. for light casting alloys; requirements of U. S. Navy Department for castings and seawater corrosion; protective coatings; necessity of light weight in all forms of transport.

Duralumin. See DURALUMIN.

Lautal. Lautal in Ship Construction. Metal Industry (Lond.), vol. 30, no. 5, Feb. 4, 1927, p. 141. Its successful use in rotors of new motorship Barbara.

Properties and Uses. Aluminum Alloys, D. Hyman. Foundry Trade Jl., vol. 35, no. 545, Jan. 27, 1927, pp. 74–77, 1 fig. Nature of aluminum; commercial impurities; effect of alloy in copper; aluminum-silicon alloys; commercial alloys; improving properties; corrosion heat treatment; aging; foundry application; gating; contraction. In discussion, action of chills, American practice compared, and aluminum alloys at elevated temperatures are touched upon

Silumin. Silumin and Its Structure, B. Otani. Tôhoku Imperial Univ.—Sci. Reports, vol. 15, no. 5, Nov. 1926, pp. 679–719, 13 figs. Presents theory explaining occurrence of fine structure from results obtained from experiments carried out by author; binary diagram of aluminum and silicon system; process of producing silumin; different fluxes and their modifying action; cooling velocity and structure of aluminum and silicon alloys; eutectic crystallization and electric resistances. (In English.)

ALUMINUM BRONZE

Casting. Some Facts about Aluminum Bronze, W. Baunard. Brass World, vol. 23, no. 1, Jan. 1927, pp. 3–5. Practical hints to aluminum foundries concerning best methods of obtaining satisfactory castings; difficulties which face beginner, when attempting fine work.

AMMONIA

Liquid, Precooling. Precooling Liquid Ammonia, W. Jahnke. Power, vol. 65, no. 4, Jan. 25, 1927, pp. 122–123, 3 figs. Methods used to precool liquid ammonia before it reaches evaporator in single and multi-stage plants, and saving to be anticipated.

AUTOGENOUS WELDING

Copper Fireboxes. Autogenous Welding of Copper Fireboxes (Das autogene Schweissen von kupfernen Feuerbüchsen), Prinz. Organ für die Fortschritte des Eisenbahnwesens, vol. 81, no. 22, Nov. 30, 1926, pp. 458–461, 12 figs. Results of tests carried out in Munich; economy of autogenous welding of fireboxes in production, operation and maintenance; cost data; testing of welds.

AUTOMOBILE ENGINES

Andreau. Andreau Stationary-Type Engine (Moteur à explosion Andreau, Du Type Fixe). Génie Civil, vol. 89, no. 23, Dec. 4, 1926, pp. 503–504, 6 figs. Improved type built by Citroën Gear Co. in France on commercial scale; kinematic characteristic of engine is that head of connecting rod describes sort of deformed lemniscate curve; unusual type of counterbalance was used on each of crankshafts in order to solve question of dynamically balancing single-cylinder engine; results of tests. See brief translated abstract in Mech. Eng., vol. 49, no. 2, Feb. 1927, p. 169.

Carburetors. See CARBURETORS.

Fuels. See AUTOMOTIVE FUELS.

Heavy-Oil. High-Speed Oil Engines for Automobiles (Schnellaufende Oelmotoren für Kraftfahrzeuge), L. Hausfelder. Motorwagen, vol. 29, nos. 24, 27, 34, 35 and 36, Aug. 31, Sept. 30, Dec. 10, 20, and 31, 1926, pp. 557–566, 649–654, 841–850, 872–876 and 898–902; and vol. 30, no. 1, Jan. 10, 1927, pp. 9–13, 57 figs. Review of attempts in Germany immediately after war to adapt automobile engines to heavier fuels; results obtained with modified carburetors; hot-bulb engines; use of Diesel engines; these are either of ante-chamber or of direct-jet type; latter type have been developed by Deutz M.A.N. works, with idea of avoiding contact with cylinder and piston walls before combustion is well developed. See brief translated abstract in Automotive Abstracts, vol. 4, no. 11, Nov. 20, 1926, p. 338.

Hercules. Hercules Building Four-Cylinder Industrial Engine in Three Sizes. Automotive Industries, vol. 56, no. 3, Jan. 22, 1927, p. 85, 1 fig. Smallest model has $5^1/_2$-in. bore, 7-in. stroke and piston displacement of 665 cu. in.; delivers 90 hp. at 1400 r.p.m.

Starting. Air Starters (Luftdruckanlasser), A. König. Motorwagen, vol. 29, no. 33, Nov. 30, 1926, p. 819. Air starting is said to be much more dependable than electric starting; braking and starting never occur at same time, and it is possible to start in emergency with engine in gear; this means much greater smoothness and acceleration.

AUTOMOBILE MANUFACTURING PLANTS

Ford Motor Co., England. The Works of the Ford Motor Company (England), Ltd. Automobile Engr., vol. 17, no. 224, Jan. 1927, pp. 9–14, 14 figs. Examples of present practice at Trafford Park factory.

AUTOMOBILES

Armstrong Siddeley. The 14 H.P. Armstrong Siddeley Chassis. Automobile Engr., vol. 17, no. 224, Jan. 1927, pp. 2–8, 13 figs. New car gives commendable impression of lightness, layout reflecting effort to secure good power-weight ratio; simplification is noticeable in certain directions; features that are not general in cars of this size and class are torque tube gear box and plain spur steering gear with its transverse rod; engine, which is 4-point suspended, is 4-cylinder overhead-valve type, with push-rod actuation.

Bean. The Six-Cylindered Bean Car. Auto-Motor Jl., vol. 32, no. 5, Feb. 3, 1927, pp. 97–100, 12 figs. It has 4-wheel brakes and special long springing.

Brakes. Mechanical and Hydraulic Servo Brakes (Mechanische und hydraulische Servo-Bremsen), A. H. Burkart. Automobil-Rundschau, vol. 28, no. 18, Dec. 15, 1926, pp. 424–427, 10 figs. Deals with Renaux triple-shoe brake of Rochet-Schneider car, brakes on Hispano-Suiza, Rolls-Royce, Lockheed, and other types.

Epicyclic Gears. The Furness Epicyclic Gear. Motor Transport, vol. 44, no. 1142, Jan. 31, 1927, pp. 125–126, 2 figs. Promising transmission unit affording 4 speeds forward and reverse controlled by ingenious foolproof selector mechanism.

Headlighting. Résumé of Automobile Headlighting Progress for the Past Year. Illum. Eng. Soc.—Trans., vol. 22, no. 1, Jan. 1927, pp. 29–42. 1926 report of committee on motor-vehicle lighting.

Humber. The 20–55 H.P. Six-Cylindered Humber. Auto-Motor Jl., vol. 32, no. 4, Jan. 27, 1927, pp. 77–79, 10 figs. Engine is of Humber overhead inlet-valve type.

Morris. Morris' New 15.9 Hp. Model Designed Primarily for Export, M. W. Bourdon. Automotive Industries, vol. 56, no. 3, Jan. 22, 1927, pp. 86–87, 2 figs. Has 4-cylinder L-head engine of 153 cu. in. displacement with single-plate clutch and 4-speed transmission; road clearance increased by raising brake gear.

Schneider. The New Th. Schneider. Auto-Motor Jl., vol. 32, no. 3, Jan. 20, 1927, pp. 55–57, 9 figs. New model of 10 to 45 hp.; new overhead valve-gear engine; improved starting and lighting; new back axle; improved ignition control and accelerated cooling.

Swift. The New 10 H.P. Swift. Auto-Motor Jl., vol. 31, no. 50, Dec. 30, 1926, pp. 1077–1079, 10 figs. New coachwork, improved springing, larger chassis, more powerful engine and better hill-climbing capabilities.

Talbot. The New Six-Cylindered Talbot. Auto-Motor Jl., vol. 32, no. 2, Jan. 13, 1927, pp. 33–36, 10 figs. General arrangement provides monobloc engine with gear box attached by member which surrounds but does not enclose clutch and flywheel; from gear, power is taken by enclosed propeller shaft to helical-bevel-driven axle of interesting design.

AUTOMOTIVE FUELS

Anti-Knock Compound. Influence of an Anti-knock Compound in a Gas-Ion Oxidation, S. C. Lind and D. C. Bardwell. Indus. & Eng. Chem., vol. 19, no. 2, Feb. 1927, pp. 231–233. Actual comparison of rates with and without diethyl selenium, of slow oxidation of methane under ionizing influence of alpha-radiation does not indicate any retardation by anti-knock compound but rather some acceleration; interpretation of this and its possible bearing on anti-knock theory.

Gasoline. See GASOLINE.

Potential Sources. Motor Car and Motor Fuel Potential, G. Egloff. Mich. Technic, vol. 40, no. 2, Jan. 1927, pp. 7–10 and 27–28, 4 figs. Urge of present period is to produce high anti-knock motor fuels in quantities sufficient to operate high-compression motors which must come on market so that more mileage per gallon of motor fuel will be obtained; paraffin, unsaturated, naphthene and aromatic hydrocarbons; treating of motor fuel.

AVIATION

Airway Lighting. Twenty-Four Inch Revolving Incandescent Beacon Air Corps Type B-3, W. T. Harding. Air Corps Information Cir., vol. 6, no. 574, Oct. 15, 1926, 7 pp., 6 figs. This beacon is development of General Elec. Co., and Engineering Division; its function is to provide night airways guide to pilots by means of high-intensity revolving light source.

Barometric Charts, Use of. The Use of Barometric Charts in the Navigation of Airships, N. L. Silvester. Roy. Aeronautical Soc.—Jl., vol. 31, no. 193, Jan. 1927, pp. 60–80, 13 figs. Results of study undertaken to minimize risks of handling airship;

author attempts to demonstrate that in some cases it might be possible by skilful navigation, aided by frequent communication of isobaric charts by wireless telegraphy and by accurate positions given frequently by same means, for pilot to keep in air during passage of bad weather and thus avoid risk of wreck by attempting premature landing.

Landing Fields. Modern Landing Fields (Moderne Flughafen-Anlagen), E. Eberstein. Luftfahrt, vol. 30, no. 20, Oct. 20, 1926, pp. 309–310, 5 figs. Problems of design for landing fields of medium size.

B

BEARINGS

Friction. Significance of Hydrodynamic Bearing-Friction Theory in Practice (Bedeutung der hydrodynamischen Lagerreibungstheorie für die Praxis), S. Kiesskalt. V.D.I. Zeit., vol. 71, no. 7, Feb. 12, 1927, pp. 218–222, 4 figs. Discusses main results of bearing-friction theory and presents them in graphic form; influence of length of bearing; uniform viscosity and deformation; problems of lubrication; influence of pressure and temperature on viscosity of oil based on author's own measurements; review of physicochemical problems of partial lubrication and oil production and testing according to present conditions.

BEARINGS, BALL

Angular-Contact. Use of Angular Contact Ball Bearings, T. C. Delaval-Crow. Machy. (N. Y.), vol. 33, no. 6, Feb. 1927, pp. 406–409, 9 figs. Combined radial and thrust bearings; angle of contact determines thrust capacity; action of thrust bearing; applications of angular-contact bearings to machine tools.

BLAST FURNACES

Tuyere Connection. Blast-Furnace Tuyere Connection. Iron & Coal Trades Rev., vol. 114, no. 3071, Jan. 7, 1927, p. 5, 3 figs. Describes connection developed by H. Crowe, essential feature of which is improved form of constructing goose neck, which has spherical joint at its upper end so arranged as to possess ample movement in every direction, and fitted with one set of tension gear whose force acts in one direction only, allowing for expansion of all parts.

Weirton, W. Va. New Stack Ranks Among Largest, G. F. Tegan. Iron Age, vol. 119, no. 4, Jan. 27, 1927, pp. 278–279, 1 fig. New blast furnace of Weirton Steel Co. can produce 1000 tons daily; layout permits direct pouring into 65-ton ladles, which usually go to mixer in open-hearth plant.

BLOWERS

Turbo. Latest Practice Found in New Power and Blowing Plant of Inland Steel Company, W. Sykes. Power, vol. 65, no. 6, Feb. 8, 1927, pp. 194–196, 5 figs. Modern condensing turbine-generator and turbine-blower plant supplied from boilers burning blast-furnace gas supplemented in part by oil; boilers are operated 6 months at a time without shutdown; power is generated per kilowatt-hour for less than 20,000 B.t.u. in gas.

BOILER FEEDWATER

Condensation Water, Utilization of. Utilization of Condensing Water for Boiler-Feed Purposes (Die Frage der Kondenswasserverwertung für Kesselspeisezwecke), A. Stern. Wärme, vol. 49, no. 50, Dec. 10, 1926, pp. 868–870, 1 fig. Advantages and disadvantages of lime in feedwater; boiler corrosion due to air in feedwater; enrichment of air in feedwater by use of feed pumps; automatic boiler-feed plants which prevent absorption of air; how high-pressure boilers should be fed.

Treatment. The Scientific Treatment of Boiler Feed Water, Introducing the Colloidal Aspect, W. B. Lewis and S. G. Irving. Ceramic Soc.—Trans., vol. 25, 1925–26, pp. 200–205 and (discussion) 205–208. Application of colloidal chemistry to feedwater problems; water-softening plants; oxygen and corrosion.

BOILER FURNACES

Gas and Pulverized-Coal-Burning. Burning Gas and Powdered Coal, J. G. Coutant. Iron Age, vol. 119, no. 6, Feb. 10, 1927, pp. 419–420, 3 figs. Boiler-furnace design for blast-furnace gas and pulverized fuel, separately or in conjunction.

Heat-Loss Estimation. How Thermocouples May Be Used for Estimating Heat Loss from Surfaces, C. A. Miketta. Power, vol. 65, no. 4, Jan. 25, 1927, pp. 127–128, 1 fig. Heat loss through furnace wall can be estimated directly by measuring surface temperature and referring to chart; with information given, radiation need no longer be classified with "unaccounted for" losses.

Oil-Fired. Enlarged Oil Furnace Increases Efficiency, F. Krug. Power Plant Eng., vol. 31, no. 4, Feb. 15, 1927, pp. 242–244, 3 figs. Boiler furnace remodeled to increase capacity and decrease maintenance expense.

Overfire Air Injection. Overfire Supplementary Air Introduction, A. E. Grunert. Power Plant Eng., vol. 31, no. 4, Feb. 15, 1927, pp. 245–247, 3 figs. Among advantages derived from the use of overfire air injection is shortening of condition known as long flaming, hence reduction of final temperatures when heating surfaces are of same degree of cleanliness; combustion can be carried on with higher CO_2 without formation of unburned combustible gases; slag and soot deposit in first pass is reduced as incidental effect of reducing long flaming; effectual elimination of smoke nuisance is accompanied by actual increase in combustion efficiency.

Increasing the Oxygen Supply over the Fire, A. E. Grunert. Power, vol. 65, no. 4, Jan. 25, 1927, pp. 130–131, 2 figs. Air drawn from main forced-blast duct and forced through series of nozzles at furnace front toward center of grate eliminates smoke and gives better combustion by supplying oxygen where there is deficiency and by improving air and gas mixture.

Radiant-Heat Absorption. Developments in Furnace Design, E. G. Ritchie and J. Mayer. Elec. Times, vol. 71, no. 1839, Jan. 20, 1927, pp. 80–81, 2 figs. Relating to use of radiant-heat absorbing surface.

Steam Jets. Improvement in Combustion by the Use of Steam Jets, C. D. Zimmerman. Power, vol. 65, no. 5, Feb. 1, 1927, p. 159, 3 figs. Steam jets have been installed on group of nine boilers at Lake Shore station of Cleveland Elec. Illuminating Co. with marked improvement in combustion.

BOILER PLANTS

Lubrication in. Boiler Plant Equipment, A. F. Brewer. Elec. Light & Power, vol. 5, no. 2, Feb. 1927, pp. 32–34 and 98, 6 figs. Tube-cleaning devices and their lubrication; economizers; steam-cylinder lubrication.

BOILER TUBES

Blowouts. Why Boiler Tubes Blow Out, J. M. Brennan. Power, vol. 65, no. 7, Feb. 15, 1927, pp. 242–244, 3 figs. External causes: (1) impingement of furnace flame; (2) slow distillation of tube metal by impregnation with fuel oil; (3) corrosion of external side of tube by sulphuric acid, formed by combination of moisture and combustion products of sulphur in oil used. Internal causes: (1) scale-forming feedwater; (2) grease on tubes; (3) steam locking or reverse of water flow; (4) corrosive feedwater; (5) segregation of tube metal. Notations are based on author's observations made where such conditions existed.

BOILERS

Cracks and Corrosion. Cracks and Corrosion in Boiler Parts (Rissbildungen und Anfressungen an Dampfkesselelementen), F. Körber and A. Pomp. Zeit des Bayerischen Revisions-Vereins, vol. 30, nos. 23 and 24, Dec. 15 and 31, 1926, pp. 279–285 and 295–301, 29 figs. Investigation with aid of Fry etching process of water tubes, boiler heads with and without manholes, etc.; relationship between cracks and corrosion; process of corrosion and crack formation; influence of quality of material, boiler construction and operating conditions on crack formation and corrosion.

Electric. Electric Boilers for Industrial Drying (L'emploi des chaudières électriques en sechage industriel), G. Manquat. Technique Moderne, vol. 19, no. 1, Jan. 1, 1927, pp. 25–26, 1 fig. Electric boilers show to special advantage where surplus hydroelectric energy is available, but they are being used to increasing extent even where energy has to be purchased at ordinary power rates and where fuel costs would be lower with coal-fired boilers; in industrial drying plant, they can be installed in each drying chamber, whole heat equivalent of electrical energy consumed being then usefully applied; for such service one might use special type of electric boiler, provided with ribbed radiator tubes so that steam is condensed as rapidly as it is formed; such self-contained boiler and radiator would be cooled by air in drying chamber; electric boilers show greatest savings in small drying installations. See brief translated abstract, Power Engr., vol. 22, no. 251, Feb. 1927, p. 74.

High-Pressure. High Pressure Steam Generation and Influence on Boiler Construction, A. Spyer. Ingeniörs Vetenskaps Akademien—Meddelande, no. 60, 1926, pp. 40–61, 10 figs. Discusses question of reduction in heat content with increased pressure; points out that advantages of increased pressure and superheat can readily be obtained in conjunction with existing plant; examples of American installations in which there has been gradual advance in pressure; in designing for high temperatures maintained for long periods, structure must be proportioned relatively to elastic limit of material, and not to ultimate tensile strength; consideration of steam-pipe construction and joints. (In English.)

Locomotive. See LOCOMOTIVE BOILERS.

Scale Prevention. Boiler-Scale and Rust Prevention in Hot Water (Die Verhütung von Kesselstein und Rost in heissem Wasser), M. Groeck. Gesundheits-Ingenieur, vol. 49, no. 48, Nov. 27, 1926, pp. 740–742, 1 fig. Describes Riwag water-transformation process, according to which lime and corrosion problem is solved.

Steam Generators. See STEAM GENERATORS.

Tube Beading. The Beading of Tube Ends in Boiler Walls (Ueber das Einwalzen von Rohren in Kesselwände), P. Oppenheimer. Zeit. des Bayerischen Revisions-Vereins, vol. 30, nos. 14, 15, 17, 18, 19, 20, 21, 22, 23, and 24, July 31, Aug. 15, Sept. 15, Oct. 15, 31, Nov. 15, 30, Dec. 15 and 31, 1926, pp. 167–171, 188–191, 214–216, 224–227, 237–240, 248–251, 261–263, 275–278, 288–291, and 304–305, 47 figs. Results of tests in which slow-speed electric hand-drilling machines were used; investigation of beading process; properties of plate and tubes employed; resistance of pipe sections against being drawn into small hole diameters; power required for shearing off part of tubes or wall; strain hardening of plates due to beading.

Vertical. A Study of the Stresses Which Occur in Vertical Cross Tube Boilers, A. Wrench. Boiler Maker, vol. 27, no. 1, Jan. 1927, pp. 21–22, 8 figs. Deals with expansion stresses and defects caused thereby.

BRAKES

Air. Brakes for Freight Train (Die Bremse für Lastzüge). Glasers Annalen, vol. 50, no. 2, Jan. 15, 1927, pp. 24–26, 3 figs. Refers to introduction of Knorr air brakes for freight trains and discusses advantages to be obtained by use of such brakes.

Trials with Vacuum Brakes on Long Goods Trains, R. C. Case. Ry. Board of India—Tech. Paper, no. 254, 1926, 11 pp., 14 figs. Results of trials to ascertain behavior of brake on long freight trains; conclusions based on tests.

Wheel and Brake-Shoe Contact. Results of Tests for Determination of Friction Between Wheel and Brake Shoe (Ergebnisse der Versuche für die Ermittlung des Reibungswertes zwischen Rad und Bremsklotz). Glasers Annalen, vol. 50, no. 1189, Jan. 1, 1927, pp. 149–159, 12 figs. Results of tests to determine influence of speed, specific brake-shoe pressure, and brake-shoe hardness and temperature.

BRASS

Cast, Transition Point. A Study of the 470 Deg. Cent. Transition Point in Cast 60:40 Brass, F. H. Clark. Am. Inst. Min. & Met. Engrs.—Trans., no. 1637-E, Feb. 1927, 18 pp., 51 figs. Comparison of rolled and cast 60:40 brass gives same results when they are heated up into beta range, quenched in iced brine, and reheated at varying temperatures; at 200 deg. cent. fine sorbitic structure appears; above 450 deg. both alloys contain annealing twins; drastic quenching in iced brine, together with change in volume, due to breaking down of beta into fine, sorbitic structure, has distorted space lattice and produce strain gradient. Bibliography.

Hot Rolling. Modern Developments in the Hot Rolling of Brass and Copper in Germany. Metal Industry (Lond.), vol. 30, no. 1, Jan. 7, 1927, pp. 43–45, 1 fig. Method has lately been largely adopted in Germany by which practically any brass alloys can be hot rolled; method requires that slabs to be rolled should be cast in specially designed iron molds and rolled in three-high rolling mill at rolling speed of about 7 ft. per sec.

BRASS FOUNDRIES

High-Pressure Fittings. Brass Casting High Pressure Fittings, A. Murphy. Can. Foundryman, vol. 18, no. 1, Jan. 1927, pp. 7–9, 6 figs. To produce thousands of different castings, many of which must withstand high pressures and, in some cases, gasoline, James Morrison Brass Mfg. Co., Toronto, have developed efficient foundry production methods; 210-lb. crucibles are used; removing core.

Methods and Equipment. A Large and Unusual Brass Foundry. Metal Industry (N. Y.), vol. 25, no. 1, Jan. 1927, pp. 1–3, 5 figs. Detailed description of brass foundry of Wm. Cramp & Sons Ship & Engine Building Co.

C

CABLEWAYS

Equilibrium Profile. Equilibrium Profile of a Cableway (Das Gleichgewichtsprofil einer Standseilbahn), E. Kruppa. Zeit. für angewandte Mathematik u. Mechanik, vol. 6, no. 6, Dec. 1926, pp. 478–483, 2 figs. Numerical calculation based on assumption that both cars are suspended at the ends of rope which is carried by means of rolls along track and which is usually driven by means of motor-operated gear in upper station.

CAR DUMPERS

Electric Control. Car Dumper Electrically Controlled. Blast Furnace & Steel Plant, vol. 15, no. 1, Jan. 1927, pp. 21–24, 5 figs. Details of Toledo car dumper; it is first time that generator field (Ward Leonard) control is used for operation of mule-haulage and cradle-hoist functions; auxiliary functions are operated by rheostatic control; all power is d.c. at potential of 250 volts.

CARBURETORS

Airplane-Engine. Development and Test of Stromberg NA-Y5D Carburetor for Curtiss D-12 Engine, J. M. Miller. Air Corps Information Cir., vol. 6, no. 572, Sept. 15, 1926, 15 pp., 15 figs. Test was conducted for purpose of developing carburetor which would function satisfactorily during maneuvers in pursuit-type airplanes; this type of carburetor does not cut out during take-off, and functions better during maneuvers than standard Stromberg NA-Y5.

Development and Test of Zenith ED-52 Carburetor for Liberty "12" Engine, J. M. Miller. Air Corps Information Cir., vol. 6, no. 570, Sept. 1, 1926, 19 pp., 22 figs. Object of development was to obtain carburetor which did not have defects of Zenith US-52 when operating without supercharger.

Non-Back Firing Carburetor for Aircraft Engines (Carburateur pour moteurs d'aviation, système Le Grain, supprimant les retours de flamme). Génie Civil, vol. 89, no. 26, Dec. 25, 1926, p. 598, 3 figs. In carburetor designed by R. LeGrain non-back firing feature is worked out on basis of fact that air-gasoline mixture containing excessive amount of latter does not support propagation of flame; tests on engines equipped with this carburetor show slight increase of power output and speed, accompanied by notable decrease in gasoline consumption. See brief translated abstract in Mech. Eng., vol. 49, no. 3, Mar. 1927, p. 264, 1 fig.

French and German Developments. Recent French and German Developments. Automotive Industries, vol. 56, no. 4, Jan. 29, 1927, p. 13, 2 figs. Mixture and control device developed by Panhard & Levassor, Paris, in which richness of mixture produced by carburetor can be controlled in very simple way; arrangement for direct-actuated overhead valves employing two coiled springs in series has been patented by Siemens & Halske, Germany.

Metering-Jet Calibration. Carburetor Metering Jet Calibration. O. Chenoweth. Air Corps Informa-

tion Cir., vol. 6, no. 569, Sept. 1, 1926, 13 pp., 16 figs. Test to develop means of calibrating carburetor metering jets suitable for adoption as standard method by Army and Navy Air Services and carburetor manufacturers.

CAST IRON

Alloying Unit. Alloying Unit for Gray Iron Plants, H. P. Parrock. Iron Age, vol. 119, no. 3, Jan. 20, 1927, pp. 203–205. Suggests practical method of improving gray-iron foundry trade by increasing range of useful irons by use of alloys; proposes use of open-hearth furnace of suitable size and type, conveniently placed to take hot metal, with small complementary electric furnace for melting alloys; this melting and alloying unit would constitute an intermediary step between blast furnace and pig machine.

Automotive Industry. Cast Iron Relating Particularly to the Automotive Industry, E. J. Lowry. Am. Metal Market, vol. 34, no. 32, Feb. 15, 1927, pp. 13–15. It is concluded that misinformation regarding cast irons has caused unfortunate circumstances to surround its application; there is too little authentic information regarding elements of cast iron; Brinnell test does not actually indicate hardness, combined carbon, wear or machinability, but quality raw materials affect these factors; expansion of raw materials affect resulting product; wear and machinability are induced by quality materials.

High-Grade. High-Grade Gray Cast Iron and Its Production (Hochwertiger Grauguss und seine Herstellung), Klingenstein. Giesserei-Zeitung, vol. 23, no. 24, Dec. 15, 1926, pp. 680–686, 26 figs. Classification of gray cast iron according to its tensile strength; relations of mechanical properties and their analyses; Lanz-Perlit-Maurer diagram; Greiner-Klingenstein diagram; desulphurization; Thyssen-Emmel process; Corsalli process; Wüst furnace; graphite removal in gray iron.

Improvements. Old Methods in New Form for Improvement of Cast Iron (Alte Verfahren der Gussveredelung in neuer Auflage), A. Lissner. Giesserei-Zeitung, vol. 23, no. 24, Dec. 15, 1926, pp. 678–679. Gives proof that some of modern improvement processes are not new discoveries, but were formerly known and since forgotten; shaking and jolting of cast iron was developed by H. Storek, 23 years ago.

Low-Carbon. High Strength Cast Iron of Low Total Carbon Content. Foundry Trade Jl., vol. 35, no. 545, Jan. 27, 1927, pp. 79–80. Synthetic and pseudo-synthetic irons; semi-steel cast iron; Thyssen-Emmel iron.

Nickel. Nickel and Nickel-Chromium Cast Iron as Now Used in America, T. H. Turner. Foundry Trade Jl., vol. 35, nos. 544 and 545, Jan. 20 and 27, 1927, pp. 59–61 and 71–73, 5 figs. Influence of Ni and of Ni-Cr additions to cast iron; machinable hardness; extent to which Ni-Cr alloy cast irons are now being used; automobile castings; Diesel-engine iron. Jan. 27: Marine and locomotive cylinders, liners and other cast-iron parts; cost of making nickel and nickel-chromium additions to cast iron; application to centrifugal casting; method of adding nickel and chromium.

Testing. Impact Testing of High Duty Cast Iron. Foundry Trade Jl., vol. 35, no. 546, Feb. 3, 1927, pp. 98–100. Review of paper by J. G. Pearce, and discussion, together with author's reply.

CASTINGS

Defects, Legal Aspects. The Legal Aspect of Defects in Castings. Foundry Trade Jl., vol. 35, no. 543, Jan. 13, 1927, pp. 23–25. In High Court of Justice (England), was held a case of exceptional interest to foundrymen; plaintiffs (ship repairers) claim damages from defendant company (engine builders) for breach of contract or warranty: cause of suit was crack which formed in cylinder, supplied by defendants, after it had been installed in ship; cylinder was found to be defective; crack was found to be inherent, and due to contraction in manufacture; judgment was rendered for plaintiff's claim and counterclaim with costs. See also editorial comment on p. 21.

CENTRAL STATIONS

Columbia, Ohio. Columbia Sets Record of 12,495 B.t.u. per kw-hr., C. W. DeForest. Power Plant Eng., vol. 31, no. 3, Feb. 1, 1927, pp. 181–185, 7 figs. With average plant thermal efficiency of 27 per cent for Oct., Nov. and Dec. 1926, economies are 12,657, 12,529, and 12,495 B.t.u. per kw-hr., respectively; turbine equipment consist of two General Electric tandem units of 45,000 kw. each; there are four Babcock and Wilcox boilers per turbine unit, consisting of three standard boilers and one reheat boiler.

12,495 B.T.U. Per Net Kilowatt-Hour, C. W. DeForest. Elec. World, vol. 89, no. 7, Feb. 12, 1927, pp. 341–345, 6 figs. Obtained during 12th month of operation at Columbia station, which employs powdered coal, 600-lb. steam pressure, tandem turbines, steam reheat and three-stage bleeding; effect of tuning-up periods.

Cost Recording in. Generating Station Costs, R. O. Kapp. Elec. Rev., vol. 100, no. 2566, Jan. 28, 1927, pp. 124–126, 4 figs. Logarithmically ruled paper has certain advantages over ordinary squared paper, but hyperbolic ruling is more generally useful in engineering work; suits costing problems particularly well.

Equipment Erection. Suggestions for Safe Erection of Power-Plant Equipment, N. L. Rea. Power, vol. 65, no. 7, Feb. 15, 1927, pp. 238–241, 20 figs. Hemp. rope, wire rope and chains are used for handling power-plant equipment and upon their proper care and use depends not only safety of equipment, but also that of those doing erecting work; things to do and not to do in handling machinery.

Florida. St. John's River Power Station. South. Power Jl., vol. 45, no. 2, Feb. 1927, pp. 36–41, 11 figs. Ultimate capacity of plant, 100,000 kw.; steam pressure, 400 lb. gage; oil used as fuel at present; pulverized-coal equipment to be installed: present generating capacity, 12,500 kw.

Southern States. Recent Power Plant Installations in the South. South. Power Jl., vol. 45, no. 1, Jan. 1927, pp. 2–12, 18 figs. Few examples of what is going on in power-plant field in Southern States.

Texas. Neches Power Station, Gulf States Utilities Company, Beaumont, Texas, H. W. Struck. Stone & Webster Jl., vol. 40, no. 2, Feb. 1927, pp. 203–212, 4 figs. Present installation consists of 21,000-kw. steam turbo-generator unit with two 1530-hp. Babcock & Wilcox cross-drum-type boilers; steam pressure is 350 lb. per sq. in. and total temperature 700 deg. fahr.; electrical energy is transmitted by newly constructed step-up transformer and high-tension transmission-line system.

Utica, N. Y. Reliability and Safety Outstanding Features in New Stand-by Plant. Power, vol. 65, no. 5, Feb. 1, 1927, pp. 154–158, 8 figs. Harbor Point steam plant of Utica Gas & Electric Co., is designed for stand-by service, but is so arranged that future extensions may be easily made to take care of any requirements that may arise; development has been laid out for 185,000 kva. with 37,500 kva. installed.

Victoria, Australia. Steam Plant at the Yallourn Power Station, Victoria. Commonwealth Engr., vol. 14, no. 4, Nov. 1, 1926, pp. 134–141, 8 figs. Station on Yallourn brown-coal field has generator plant capacity of 62,500 kw. in five 12,500-kw. units; steam is supplied by 12 boilers.

CHIMNEYS

Heating Boilers. A Rational Method for Determining Sizes of Chimneys for Heating Boilers, R. V. Frost. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 33, no. 2, Feb. 1927, pp. 99–104, 1 fig. Presents table on average stack temperatures for corresponding temperatures at boiler outlet; upon calculation and comparison with draft intensities that were obtained in tests it was found that average temperatures selected checked very closely with theoretical temperatures.

COAL

Calorific Value. So-Called and Actual Calorific Value (Sogenannter und wirklicher Heizwert), D. Hudler. Feuerungstechnik, vol. 15, no. 5, Dec. 1, 1926, pp. 49–52. Comparison of upper, lower, and actual calorific value in case of bituminous coal and lignite; actual value can only be used as relative term for comparison of different values; calculation of effective value of bituminous coal.

Carbonization. The Crozier Process, David Brownlie. Gas Age-Record, vol. 59, no. 7, Feb. 12, 1927, pp. 225–227, 3 figs. Low-temperature carbonization of shale, torbanite, cannel, non-coking coals and the like.

Pulverized. See PULVERIZED COAL.

COAL HANDLING

Developments. A Brief Review of Some Recent Developments in Coal and Coke Handling and Storage, H. Blyth. Gas Engr., vol. 43, no. 609, Jan. 1927, pp. 5–7, 4 figs. Application of reinforced concrete for supporting telpher lines; new coaling plant at Balmarnock.

Pneumatic Plant. Pneumatic Coal Handling Plant in a London Brewery, J. S. Gander. Eng. & Boiler House Rev., vol. 40, no. 8, Feb. 1927, pp. 399–404, 5 figs. From wharf two suction lines join 7-in. pipe which crosses road, passes through factory, spans a yard, and then deposits into receiver over storage house; from this store, by separate operation, coal is drawn through piping over another open yard, through factory again, over special road bridge, and then along roofs to boiler-house receiver.

COLD STORAGE

Insulation. The Fundamentals of Cold Storage Insulation, S. Kay. Cold Storage, vol. 29, no. 344, Nov. 18, 1926, pp. 465–466. Consideration of factors of efficiency.

Paris Freight Station. The Paris-Vaugirard Cold Stores, W. W. O'Mahoney. Ice & Cold Storage, vol. 30, no. 346, Jan. 1927, pp. 7–10, 5 figs. Design and equipment of Paris-Vaugirard entrepôt.

CONDENSERS, STEAM

Practice and Performance. Steam-Condenser Practice and Performance, F. J. Chatel. Mech. Eng., vol. 49, no. 3, Mar. 1927, pp. 227–233, 16 figs. and (discussion) 238–242, 3 figs. Presents general idea of steam-condenser practice and performance in four plants of Detroit Edison Co.; condenser performances from time of original installations down to present show marked improvement; this indicates that condensers of single-pass type with range of from 0.95 to 1.05 sq. ft. of surface per kilowatt of turbine capacity should be considered good practice; their performance seems to outweigh fact that somewhat larger amount of water is necessary for this type than for two-pass condenser or condenser having more tube surface.

Surface. Operating Performance of Some Modern Surface Condensers, P. Bancel. Mech. Eng., vol. 49, no. 3, Mar. 1927, pp. 219–226, 16 figs. and (discussion) 233–236. By means of operation records, author shows (1) that modern condenser required about half cooling surface of conventional type; (2) there is no essential difference between operating and test performance; (3) results obtained are based on fundamental improvements in design which produce high efficiency in utilization of surface with small expenditure of power; and (4) change from two-pass to single-pass hydraulic circuit is result of improved efficiency and not cause.

Twin Surface Condensers at the Valley Road Power Station, Bradford. Engineering, vol. 123, nos. 3186 and 3187, Feb. 4 and 11, 1927, pp. 125–127 and 160–162, 30 figs. partly on supp. plate. Constructed by Cole, Marchent & Morley; they are located immediately under low-pressure turbine, which is of double-flow type with two exhaust openings; they are required to dispose of 240,000 lb. of steam per hour, with cooling water supplied at 75 deg. fahr.; to meet these requirements manufacturers provided specified area of 35,000 sq. ft. of tube surface; tubes are of Admiralty mixture, tinned inside and out, and are mounted on springs, which makes it possible to dispense with expansion joint between them and turbine.

Tubes. Accelerating the Drip from Condenser Tubes (Betrachtungen an Oberflächen-Kondensatoren), H. Kühne. Schiffbau, vol. 27, no. 24, Dec. 15, 1926, pp. 743–744, 5 figs. Considers effect of condensate without reference to subsidiary effects of air and steam; basic idea of Ginabat condenser is that dripping condensate should touch as little as possible of underlying tubes, so as to leave maximum area of dry tube for condensing steam; actually, whole of surface of tubes is wet by mixture of air and steam, and drop falling on wet tube spreads throughout existing film of moisture and gradually forms fresh drop on under side of tube; by accelerating rate of dripping from tube subjected to particular flow of condensate, thickness of film of liquid on tube may be reduced and rate of heat transmission correspondingly increased. See brief translated abstract in Power Engr., vol. 22, no. 251, Feb. 1927, p. 73.

Failures of Condenser Tubes and the Effect of Mechanical Cleaning (Kondensatorrohrzerstörungen und der Einfluss mechanischer Reinigung), M. Holler. Wärme, vol. 49, no. 51, Dec. 17, 1926, pp. 879–881, 5 figs. Results of various researches concerning condenser-tube corrosion are summarized; protective measures; information concerning effect of mechanical cleaning; it is usually considered that electrical action is contributory cause; among protective measures which have been proposed is bonding of all parts of condenser and their connection to negative terminal of d.c. generator, with view to excluding action of stray currents; recommends use of tool consisting of number of round wires arranged in spirals and adjustable in diameter by screwing sleeve at one end forward or backward. See brief translated abstract in Eng. & Boiler House Rev., vol. 40, no. 8, Feb. 1927, p. 416.

CONNECTING RODS

Articulated. The Articulated Connecting Rod, E. J. Fearn. Roy. Aeronautical Soc.—Jl., vol. 31, no. 194, Feb. 1927, pp. 133–141, 5 figs. To remedy defect of graphical method of dealing with articulated rod, Fourier's series has been developed which can be differentiated at sight and which gives remarkable accuracy; geometrical properties of mechanism have been analyzed and thus equations are formed giving resultant radial and tangential components at crankpin, bending forces and tensions on master rod, etc.; angular velocity and acceleration of auxiliary connecting rod; stress in rod due to fling; evaluation of coefficients of Fourier's series for case of 60-deg. V-type engine; method of determining "out-of-balance" forces of engine with articulated rods.

Counter-Balanced. Possibilities of the Counterbalanced Connecting Rod, K. D. Wood. Sibley Jl. Eng., vol. 41, no. 1, Jan. 1927, pp. 2–6 and 44, 7 figs. Points out facts that (1) every automobile engine made today is dynamically unbalanced; (2) inertia unbalance of 2-, 4-, and 6-cylinder engines can be completely eliminated by counterbalancing connecting rods; (3) engines thus balanced are better balanced than conventional 8-cylinder engine; (4) design of counterbalanced connecting rods is practical and adds little to cost of engine; and (5) if counterbalanced connecting rod is used, single-cylinder engine can be as well balanced as conventional six by means of geared balancer described.

CONVEYORS

Belt. Belt Conveyor at Lignite Mine of Gewerkschaft Grosskraftwerk Main-Weser, Germany [Die Gurtbandförderanlage der Gewerkschaft Grosskraftwerk Main-Weser bei Borken (Bez. Kassel)], W. Regling. Braunkohle, vol. 25, no. 39, Dec. 25, 1926, pp. 885–889, 5 figs. Describes installation of belt conveyor for underground haulage, showing how such installation can be used to advantage in lignite mines.

Electric Drive. The Application of Electric Drive to Conveyors, R. F. Emerson. Gen. Elec. Rev., vol. 30, no. 2, Feb. 1927, pp. 93–101, 14 figs. Types of conveyors and work done; factors determining power requirements; selection of type of motor to suit conveyor characteristics; a.c. and d.c. motors and control.

Pneumatic. Pneumatic Conveying of Gritty Materials, E. J. Tournier. Rock Products, vol. 30, no. 2, Jan. 22, 1927, pp. 40–50, 12 figs. General principles of pneumatic conveying; application of high-vacuum system to various materials; functions performed by various units; horsepower requirements of pneumatic conveyors; physical condition of materials in relation to pneumatic handling; low-vacuum system; pumping pulverized dry materials; applications of Fuller-Kinyon system; trend of future developments.

COOLING TOWERS

River Water vs. River Water or Cooling Towers? J. N. Waite. Elec. Rev., vol. 100, no. 2564, Jan. 14, 1927, pp. 46–48, 1 fig. Theoretical gain of thermal efficiency due to use of river water at 50 deg. fahr., as compared with water artificially cooled to 75 deg. fahr., for condensing, is partly neutralized by difficulty of dealing efficiently with immense volume of steam at pressure of 1 in. of mercury (absolute); instead of 10 per cent, net gain in practice is about 4 or 5 per cent.

COPPER

Hardened. See COPPER ALLOYS, Corson.

Phosphorized. Some Comparative Properties of Tough Pitch and Phosphorized Copper, W. R. Web-

ster, J. L. Christie and R. S. Pratt. Am. Inst. Min. & Met. Engrs.—Trans., no. 1643-E, Feb. 1927, 17 pp., 8 figs. Determination of relative effects of cold drawing upon two kinds of copper in question.

COPPER ALLOYS

Beryllium-Copper. Beryllium-Copper Alloys, W. H. Basset. Am. Inst. Min. & Met. Engrs.—Trans., no. 1634-E, Feb. 1927, 15 pp., 27 figs. Investigation to determine under mill conditions behavior of copper when alloyed with beryllium and when other metals were added to such alloys; it seems probable that, with beryllium at commercial prices, its alloys might be used for springs, stronger wires and high-strength conductors.

Brass. See BRASS.

Components, Effect of. Influence of Zinc, Tin, Ammonium and Magnesium on Copper Containing Cuprous Oxide (Ueber die Einwirkung von Zink, Zinn, Aluminium und Magnesium auf kupferoxydulhaltiges Kupfer), O. Bauer and H. Arndt. Giesserei-Zeitung, vol. 23, no. 24, Dec. 15, 1926, pp. 671-677, 21 figs., partly on supp. plates. Review of previous work on subject; diffusion and solution phenomena; behavior of cuprous oxide; experimental results in graphic form; application of results to foundry practice.

Corson Alloys. Copper Hardened by New Method, M. G. Corson. Iron Age, vol. 119, no. 6, Feb. 10, 1927, pp. 421-424, 9 figs. Besides high copper-silicon alloys there has recently been discovered group of 4 series of ternary alloys, known as Corson alloys, each containing relatively small amounts of silicon in addition to much larger amounts of chromium, iron, cobalt or nickel; all 4 series form natural class of alloys, which are amenable to heat treatment in a way that makes them appear to be counterpart of duralumin.

CORROSION

Research. Corrosion Research of the German State Chemical and Technical Institute (Korrosionsforschungen der Chemisch-Technischen Reichsanstalt), J. Hausen. Metall u. Erz., vol. 23, no. 23, Dec. 1, 1926, pp. 649-652. Protection of metals; status of present knowledge of corrosion; review of work of Chemisch-Technischer Reichsanstalt.

COST ACCOUNTING

Methods. Costing and Cost Accounts, A. H. Ripley. Indus. Mgmt. (Lond.), vol. 14, no. 1, Jan. 1927, pp. 13-18, 2 figs. Defines function of costing and important place which cost accountant occupies in industry. Paper read before Birmingham & Midland Soc. Incorporated Accountants.

COTTON

Sizing. The Uniformity of Heavy Sizing in Mill Practice, S. M. Neale. Textile Inst.—Jl., vol. 18, no. 1, Jan. 1927, pp. T25-T28, 12 figs. Imvestigation of sizing of number of warps of cloth which was known on occasion to depart rather widely from desired standard of weight.

Steeping Process. The Steeping Process, R. G. Fargher, L. R. Hart and M. E. Probert. Textile Inst.—Jl., vol. 18, no. 1, Jan. 1927, pp. T29-T45. Constituents of cotton soluble in water or dilute mineral acids and effect of their removal on subsequent scouring.

Yarns, Sizing. An Examination of the Process of Sizing Cotton Yarns on an Experimental Tape Frame, F. D. Farrow and E. H. Jones. Textile Inst.—Jl., vol. 18, no. 1, Jan. 1927, pp. T1-T24, 12 figs. Influence of twist, counts and character of lint on compactness and behavior during sizing of single cotton yarns, and with effect of physical conditions under which size is applied, on nature of process.

CRANES

Electric, Operation. Rules for the Safe Operation of Electric Overhead Traveling Cranes. Iron & Steel Engr., vol. 4, no. 1, Jan. 1927, pp. 25-26. Rules for crane operators; rules for floormen.

Locomotive. Economic Utilization of Cranes in Locomotive Repair Shops (Wirtschaftliche Ausnutzung der Hebekrane in Lokmotivausbesserungswerken), J. Franke. Organ für die Fortschritte des Eisenbahnwesens, vol. 81, no. 22, Nov. 30, 1926, pp. 450-453, 9 figs. Investigation of effective work required for hoisting locomotive with boiler; describes method developed by author for economic use of cranes which greatly reduces cost of operation.

Railway Wrecking. Railway Breakdown Crane Design, E. K. Wright. Mech. World, vol. 81, no. 2088, Jan. 7, 1927, p. 6, 1 fig. Features of interest and points that require careful consideration.

Steam. The Power Plant of a Locomotive Steam Crane, E. G. Fiegehen. Engineering, vol. 123, no. 3183, Jan. 14, 1927, pp. 60-61. Power plant consists almost invariably of vertical cross-tube boiler and two-cylinder non-condensing double-acting steam engine, fitted with Stephenson link-motion reversing gear and coupled at right angles.

Steel Mills. General Specifications for Electric Overhead Traveling Cranes—Heavy Duty Steel Mill Service. Iron & Steel Engr., vol. 4, no. 1, Jan. 1927, pp. 21-25. Specifications applying to heavy-duty steel-mill cranes, and as far as practical to cranes for special service such as stripping ingots, charging ingots into and drawing them out of soaking pits, ore handling, charging open-hearth furnaces, etc.

CRANKSHAFTS

Roller-Bearing. A Composite Roller-Bearing Crankshaft (Zusammengesetzte Rollenlager - Kurbelwelle), A. Hirth. Motorwagen, vol. 29, no. 34, Dec. 10, 1926, pp. 851-852, 1 fig. Invented by A. Hirth; it is suitable for mass production, and web is given a shape proper to take care of natural oscillation arising at high rotative speeds; provided with cylindrical roller bearing of particular type. See translated abstract in Mech. Eng., vol. 49, no. 2, Feb. 1927, pp. 170-171, 1 fig.

CUPOLAS

Economical Operation. Rational Cupola Practice (Rationeller Kupolofenbetrieb). Zeit. für die gesamte Giessereipraxis, vol. 48, nos. 1, 2 and 3, Jan. 2, 9 and 16, 1927, pp. 3-5, 18-19 and 25-26. Discusses faults in cupola practice, which can be remedied in any plant without additional costs, and with result of considerable savings; combustion ratio of CO_2 to CO; cross-section and height of shaft; additions in melting process.

Giessler-Poumay. The Giessler-Poumay Cupola. Foundry Trade Jl., vol. 35, no. 544, Jan. 20, 1927, p. 62, 1 fig. Improved system for economic melting of cast iron in cupola based on complete suppression of CO in gases which finally escape from cupola.

CUTTING METALS

Cast Iron. Metal Cutting by Means of Cylindrical Cutters (Die Metallbearbeitung mittels Walzenfräser), F. Beckh. Maschinenbau, vol. 5, no. 24, Dec. 16, 1926, pp. 1119-1121, 9 figs. Results of tests, investigating conditions in cutting of cast iron; results are utilized to determine most economical working speed.

Research. A Research in the Elements of Metal Cutting, O. W. Boston. Mech. Eng., vol. 49, no. 2, Feb. 1927, pp. 139-146, 22 figs. Confined to tool sharpness, tool form, chip dimensions and force involved.

Steel Pipe. Cutting Steel Pipe Under the Ice, L. F. Hagglund. Successful Constr. Methods, vol. 9, no. 2, Feb. 1927, pp. 32-33, 4 figs. Describes work of divers beneath surface of Lake Erie using oxy-electric torch, which combines heat of electric arc, together with oxidizing effect of gaseous oxygen under high pressure; heat of arc is sufficient to melt metal even under water, and oxygen brought in contact with this molten metal, rapidly destroys metallic structure and effects cut.

Under-Water. Cutting Metals Under-Water, L. F. Hagglund. Acetylene Jl., vol. 28, no. 7, Jan. 1927, pp. 325-327 and 357, 7 figs. Describes combination of electric arc with oxygen; depth of water does not affect arc and increase in depth simply means increase in pressure at which oxygen gas is supplied; metal-cutting apparatus consists of generating unit, switchboard and resistance, supply of oxygen, oxygen regulator and hose and double conductor hose through which both oxygen and electricity are carried to torch; application to salvage marine "S-48," and other applications.

CUTTING TOOLS

Aluminum Alloys. Turning Tool for Aluminum Alloys. Eng. Progress, vol. 8, no. 1, Jan. 1927, p. 6, 1 fig. New cutting tool which is really combination of two tools, namely: roughing and finishing tool; results of tests on alloy containing 78 per cent aluminum and 22 per cent silicon.

CYLINDERS

Finishing Bores of. Finishing Cylinder Bores. Automobile Engr., vol. 17, no. 224, Jan. 1927, pp. 24-28, 4 figs. Review of methods employed by British manufacturers.

D

DIES

Compound Blanking and Piercing. Standardized Practice Simplified Die Design, F. W. Curtis. Am. Mach., vol. 66, nos. 2, 4 and 7, Jan. 13, 27 and Feb. 17, 1927, pp. 57-60, 169-171 and 299-301, 25 figs. Jan. 13: Elimination of waste is made possible by standardizing construction of die shoes, punch holders, die blocks, wire punches, button dies, spring pins and compound-die proportions. Jan. 27: Press tools that incorporate standard units; blanking, piercing and forming tools. Feb. 17: Knurling, shaving, drawing and forming tools.

DIESEL ENGINES

Airless-Injection. The F. Krupp Works Builds Solid-Injection Diesel. Power, vol. 65, no. 6, Feb. 8, 1927, pp. 209-210, 3 figs. Drift toward airless-injection engines is recognized by F. Krupp; type is standard for medium powers; experiments made on 1000-hp. cylinder.

Beardmore-Tosi. Double-Acting Beardmore-Tosi Engines with Hydraulic Coupling: M. S. "Wulsty Castle." Engineering, vol. 123, no. 3185, Jan. 28, 1927, pp. 102-106, 14 figs., partly on supp. plates. Both engines drive on to single screw through Beardmore-Vulcan hydromechanical gearing; either engine may be disconnected by simply emptying its coupling, and propeller can then be operated by remaining engine; results of English trials.

Compressorless. A Low-Power Diesel Engine. Power Engr., vol. 22, no. 251, Feb. 1927, p. 47. "Cold-Diesel," name intended to express "compressorless Diesel," solid-injection engine designed by German engineers; design follows in main submarine engine used during World War.

Fuel and Lubricating Oil, Interrelation. Interrelation Between Fuel and Lubricating Oil. Oil Engine Power, vol. 5, no. 2, Feb. 1927, pp. 88-89. Effect of combustion on lubrication, particularly with heavy fuel.

Hamilton-M.A.N. First Hamilton-M.A.N. Diesel Engine Completed for Shipping Board. Mar. News, vol. 8, no. 9, Feb. 1927, pp. 56-57, 1 fig. Engine will be installed in Seminole, and will develop 3300 hp. at 95 r.p.m.; patented M.A.N. system of scavenging installed.

The Hamilton-M.A.N. Marine Diesel Engine. Mar. Eng. & Shipg. Age, vol. 32, no. 2, Feb. 1927, pp. 84-87, 7 figs. Four-cylinder, double-acting two-cycle engine of 3300 hp. built for Shipping Board.

Small. Smaller Diesel Engines Developed, R. H. Bacon. Mar. Rev., vol. 57, no. 2, Feb. 1927, pp. 26-27 and 46, 4 figs. Fairbanks-Morse has announced line of Diesel engines in 10-hp. cylinder size operating at speed of 650 r.p.m., suitable for direct drive for use in small craft and also in Diesel generating sets for use as auxiliaries in connection with main propulsion engines.

DRILLING MACHINES

Cam Milling on. Automatic Cam Milling on Drilling Machine. Machy. (Lond.), vol. 29, no. 743, Jan. 6, 1927, pp. 447-448, 3 figs. Simple automatic method of milling cam tracks on two-spindle vertical drilling machine.

Connecting-Rod. Double-Spindle Connecting-Rod Drilling Machine. Engineer, vol. 143, no. 3707, Jan. 28, 1927, pp. 106-107, 4 figs. Constructed by G. Swift & Sons, Halifax, to order of Bombay, Baroda and Central India Railway, for simultaneously drilling holes in ends of locomotive connecting and coupling rods.

DURALUMIN

Protective Coatings. Protective Coatings for Duralumin and Similar Light Weight Alloys for Exposed Construction, H. A. Gardner. Am. Paint & Varnish Mfrs.' Assn.—Circular, no. 296, Jan. 1927, 26 pp., 9 figs. Results of series of tests.

Welding. Duralumin Welding, W. Nelson. Aviation, vol. 22, no. 3, Jan. 17, 1927, pp. 130-132, 3 figs. Possibilities and methods of gas welding; fluxes used; welding sheet metal.

E

ELECTRIC FURNACES

Hardening. Salt Bath Hardening Furnace of German General Electric Co. (Der Salzbadhärteofen der AEG), E. Schmidt. Centralblatt der Hütten u. Walzwerke, vol. 30, no. 52, Dec. 29, 1926, pp. 569-570, 5 figs. Details of latest type; under given conditions this furnace can also be used for melting, for instance of white metal, in which case charge is placed in special crucible.

Induction. Induction Furnace Finds Wider Use, E. C. Kreutzberg. Iron Trade Rev., vol. 80, no. 2, Jan. 13, 1927, pp. 139-141, 6 figs. Describes furnace in use at new plant of Ajax Co. for melting nickel steel; melting equipment is tilting frame which holds crucible in induction coil, latter forming nest for crucible. See also description in Metal Industry (N. Y.), vol. 25, no. 1, Jan. 1927, pp. 4-5, 7 figs.

Melting. Electric Furnaces for Melting Metal. Blast Furnace & Steel Plant, vol. 15, no. 1, Jan. 1927, pp. 34-36, 1 fig. Practice in melting both iron and steel; methods of control and various furnace types.

Steel. Electrical Equipment of Arc Steel Furnaces (Ueber die elektrischen Anlagen von Lichtbogen-Elektrostahl-Ofen), K. Kalman. Centralblatt der Hütten u. Walzwerke, vol. 31, nos. 1/2, Jan. 12, 1927, pp. 3-9, 8 figs. Details of high-tension switches, measuring apparatus, switchboard, furnace transformer, wiring between transformer and furnace: influence of inductive resistances and conductor wiring on economic operation.

Tempering. Electric Furnace for Tempering Tools. Ry. Elec. Engr., vol. 18, no. 2, Feb. 1927, p. 64, 1 fig. New box or hearth-type electric furnace, particularly applicable to tempering of lathe and planer tools, dies and punches in tool rooms, is manufactured by Westinghouse Co., East Pittsburgh, Pa.

ELECTRIC LOCOMOTIVES

Control Equipment. Control Equipment on Virginian Locomotives, P. L. Mardis. Ry. Elec. Engr., vol. 18, no. 1, Jan. 1927, pp. 19-23, 10 figs. Details of improved apparatus which facilitate efficient operation.

Motor-Generator. Electric Locomotives for the Great Northern, C. E. Baston. Ry. Age, vol. 82, no. 5, Jan. 29, 1927, pp. 369-371, 3 figs. Features of Baldwin-Westinghouse motor-generator locomotives.

Storage-Battery. Storage-Battery Locomotive for Yard Work. Elec. World, vol. 89, no. 6, Feb. 5, 1927, pp. 297-298, 2 figs. Results of 4-day test in Chicago yard service, with features of equipment.

ELECTRIC WELDING, ARC

Arc Sputtering. Theory of Arc Sputtering, J. B. Green. Welding Engr., vol. 12, no. 1, Jan. 1927, pp. 29-31, 1 fig. Silent and hissing arcs; chemical changes in deposit metal and in arc atmosphere; arcs in inert cases; protective electrode coating; development of theory of sputtering and its applications.

Building Construction. Designing the Sharon Building for Arc-Welding, G. D. Fish. Eng. News-Rec., vol. 98, no. 3, Jan. 20, 1927, pp. 102-106, 6 figs. Successful construction of 5-story factory building of Westinghouse Elec. & Mfg. Co. required many departures from usual practice; continuity of beams utilized to secure economy.

Cast Iron. Electric Welding (Elektrische Schweisstechnik), P. Schimpke. Giesserei, vol. 14, no. 3, Jan. 15, 1927, pp. 33-37, 15 figs. Review of principles of modern electric welding with special regard to welding of cast iron; resistance in arc welding; cold and hot welding of cast iron; electric cutting.

Structural Steel. Arc-Welded 5-Story Building Nears Completion. Iron Trades Rev., vol. 80, no. 2,

Jan. 13, 1927, pp. 136–138, 6 figs. Welding of 5-story structure at Sharon, Pa.

ELECTRIC WELDING, RESISTANCE

Testing Welds. Testing Resistance Welds, J. W. Meadowcroft. Welding Engr., vol. 12, no. 1, Jan. 1927, pp. 41–42, 3 figs. Points out that microscope will reveal quality of joints in butt, flash and spot welding.

ELEVATORS

Controllers. How a Two-Speed A.-C. Elevator Controller Operates, C. A. Armstrong. Power, vol. 65, no. 7, Feb. 15, 1927, pp. 245–248, 3 figs. Circuits and adjustments of a.c. type of controller used with two-speed squirrel-cage motor having speed ratio of one to three.

ESCALATORS

London Underground Railway. Moving Stairways on the London Underground Railways. Engineering, vol. 123, no. 3183, Jan. 14, 1927, pp. 38–40, 18 figs. partly on supp. plate. All new stations on system are being provided with escalators; staircase is of concrete and is broken up by landings at short intervals; driving mechanism is situated at top of escalators.

EVAPORATORS

Brunler Flame. The Brunler Flame and Its Industrial Applications, O. Brunler. Engrs. & Eng., vol. 44, no. 1, Jan. 1927, pp. 8–9, 1 fig. In addition to steam raising, Brunler flame is of great use as evaporator; sewage sludge can be concentrated by this means, and steam produced is available for power; important point with regard to use of flame in chemical industry is fact that if it is worked at atmospheric pressure, steam-gas mixture is produced at temperature of 80 deg. cent.

Heat Transfer in. Improving Heat Transfer in Refrigeration Evaporating Apparatus, T. Shipley. Power, vol. 65, no. 5, Feb. 1, 1927, pp. 167–169, 4 figs. Two years' investigation made by Research Dept. of York Mfg. Co. to determine heat transmission through surface of evaporating apparatus under varied operating conditions, resulted in new designs of coils from which rates of heat transfer up to 180 B.t.u. were obtained as compared to 15 B.t.u. in average plant.

F

FACTORIES

Heating. Effective Factory Heating, K. D. Hamilton. Factory, vol. 37, no. 5, Nov. 1926, pp. 802–805, 910, 912 and 914; and vol. 38, no. 2, Feb. 1927, pp. 280–283, 360, 362 and 364, 8 figs. Nov.: Selecting and installing equipment. Feb.: Planning and operating heating system.

FANS

Pressures and Efficiencies. Fan Pressures and Efficiencies, J. H. Roberts. Colliery Eng., vol. 4, no. 35, Jan. 1927, pp. 32–37, 16 figs. Attempts to set out in logical order various pressures with comments on their derivation and uses; results of tests.

Positive and Non-Positive. Air Movers: Positive and Non-Positive, F. G. Whipp. Mech. World, vol. 81, no. 2090, Jan. 21, 1927, pp. 43, 3 figs. Notes designed to remove haziness as to limits to which fan can be employed for movement of air and maintenance of pressure.

FEEDWATER HEATERS

Design. Feed-Water Heaters, W. Smith. Mech. World, vol. 81, no. 2088, Jan. 7, 1927, pp. 3–4, 3 figs. Discusses different types of heaters, including surface or closed type, direct-contact or open type.

FEEDWATER HEATING

Bleeding Steam. Tests for Resultant Economy. Elec. Rev., vol. 100, no. 2567, Feb. 4, 1927, pp. 167–168. Calculation of ultimate gain resulting from heating of boiler feedwater by means of steam "bled" from main turbines.

FLOW OF AIR

Measurement. A Hot-Wire Instrument for Measuring Speed and Direction of Airflow, L. F. G. Simmons and A. Bailey. Lond., Edinburgh & Dublin Philosophical Mag., vol. 3, no. 13, Jan. 1927, pp. 81–96, 16 figs. Form of hot-wire speed and direction meter suitable for use over large range of wind speed, and possessing high order of directional sensitivity; measurements of airflow behind finite airfoil made with three-wire instrument.

Turbulence. Calculation of Turbulent Unconfined Flow (Berechnung turbulenter Ausbreitungsvorgänge), W. Tollmien. Zeit. für angewandte Mathematik u. Mechanik, vol. 6, no. 6, Dec. 1926, pp. 468–478, 13 figs. Discusses cases of so-called "free turbulence," that is, cases of flow without limiting walls; mixture of homogeneous air stream with adjacent still air; jet propagation as plane and as rotation-symmetrical problem; calculation of pressure differences.

FLOW OF FLUIDS

Boundary-Layer Removal by Suction. Removing Boundary Layer by Suction, J. Ackeret. Nat. Advisory Committee for Aeronautics—Tech. Memorandums, no. 395, Jan. 1927, 23 pp., 20 figs. Prandtl, in his fundamental treatise, describes experiment intended to serve as basis for conception that vortex phenomena are produced by separation phenomena in boundary layer; present article deals with prevention of this separation or detachment of flow by drawing boundary into inside of body through slot or slots in its surface; method gives results which are of practical importance for obtaining certain technical information on subject of flow; experiments demonstrate possibility of producing, through suction, certain forms of flow which stand in surprising disagreement with so-called "hydraulic sense." Translated from V.D.I. Zeit., Aug. 28, 1926.

FLOW OF LIQUIDS

Jets. Flow in Jets (Sur l'écoulement par jet), R. Mazet. Académie des Sciences—Comptes Rendus, vol. 183, no. 18, Nov. 3, 1926, pp. 735–736. Considers case of a liquid flowing under action of weight through orifice at bottom of vessel having lateral sides far apart and movement taken as parallel to and symmetrical with vertical plane of given point, free surfaces with atmospheric pressure reckoned as zero; equations for determining conditions for harmonic potential and velocity derived therefrom.

Orifices. Flow Through Circular Orifices (Sur l'écoulement à travers un orifice circulaire), R. Mazet. Académie des Sciences—Comptes Rendus, no. 2, Jan. 10, 1927, pp. 73–75. Calculations supplementary to author's two previous articles in 1926 volume of same journal.

Turbulence. Critical Flow Velocity in a Circular Tube (Die kritische Stromgeschwindigkeit im Kreisrohr), H. Lorenz. Physikalische Zeit., vol. 27, no. 16, Aug. 15, 1926, pp. 533–536, 3 figs. Extends author's previous paper on turbulence problem: for evaluating critical flow velocity, new boundary condition is derived from energy equation; result obtained is in good agreement with Schiller's latest experimental value.

Theory of "Structural Turbulence" (Zur Theorie der "Strukturturbulenz"), M. Reiner. Kolloid-Zeit., vol. 39, no. 4, Aug. 1926, pp. 314–315, 1 fig. It is shown that Ostwald's explanation of structural turbulence can be tested experimentally by measuring flow of liquids through capillary tubes of various diameters.

FLUIDS

Viscosity. Laws of Viscosity of Fluids (Lois de la viscosité des fluides), J. Dubief. Jl. de Physique, vol. 7, no. 12, Dec. 1926, pp. 402–413, 8 figs. Authors point out that up to present no law exists explaining viscosity in function of density or pressure; kinetic theory permits establishment of simple relation, which applies to compressed gases as well as to liquids.

FLYING BOATS

Dornier. New Dornier Giant Flying Boat Superwal (Das neue Dornier-Grossflugboot "Superwal"). Luftfahrt, vol. 30, no. 20, Oct. 20, 1926, p. 311, 2 figs. New metal boat is equipped with two Rolls-Royce engines of 650 hp. each; length, 23.5 m. and maximum width 3.5; span of wings, 28.5 m.

Short. The Short "Calcutta" Flying-Boat. Flight, vol. 19, no. 1, Jan. 6, 1927, pp. 3–5, 1 fig. Large flying boat of modern design in matter of hull shape, surmounted by fairly normal wing structure, and with somewhat unusual arrangement of its engines; will be enclosed in streamline nacelles.

FOREMEN

Training. Developing Foremen in Order to Reduce Waste, W. D. Stearns. Soc. Indus. Engrs. Bul., vol. 9, no. 1, Jan. 1927, pp. 7–12 and (discussion) 12–13. Study of problems involved in developing supervisors; establishment of definite policies after studying problems; methods employed in carrying out these definite policies; results obtained by developing supervisors.

FORGINGS

Brass. Brass Forgings, O. J. Berger. Mech. World, vol. 81, no. 2090, Jan. 21, 1927, pp. 50–51. Gives reasons for replacing brass castings with forgings; comparison of machining costs; finish and strength of forgings; equipment for forging shop; preparing blank; dies for hot-pressed parts, and for drop-steam hammers; importance of correct heating.

FOUNDRIES

Layout and Equipment. Layout Change Brings Operating Economies, F. Heitkamp. Foundry, vol. 55, no. 3, Feb. 1, 1927, pp. 84–89, 17 figs. Recent improvements at plant of Modern Foundry Col., Cincinnati, includes changes in foundry layout and methods and equipment used; removal of useless partition facilitates production and increases floor space; core-making department is equipped with four oil-fired steel ovens; molds are poured from ladle and pouring device suspended from crane; cleaning and grounding castings.

FUELS

Coal. See COAL; PULVERIZED COAL.

Oil. See OIL FUEL.

Pulverized Coal. See PULVERIZED COAL.

FURNACES, ANNEALING

Oil-Burning. Annealing Malleable Iron Castings in an Oil-Burning Furnace, C. C. Mark. Machy. (N. Y.), vol. 33, no. 7, Mar. 1927, pp. 518–520, 1 fig. Locating annealing pots in furnace; packing castings; determining temperature of castings; installation of pyrometers; requirements of furnace; economical operation. See also Machy. (Lond.), vol. 29, no. 745, Jan. 20, 1927, pp. 525–526, 3 figs.

FURNACES, HEATING

Ingot-Heating. A New Furnace for Rolling Mills (Ein neuer Walzwerksofen, Bauart Bohler), F. Hartmann. Stahl u. Eisen, vol. 47, no. 2, Jan. 13, 1927, pp. 57–61, 4 figs. Bohler ingot-heating furnace is shaft furnace in which charge travels in vertical direction from bottom to top of furnace; heating is effected from top towards bottom, so that ingots on top are hottest, whereas lower rows remain comparatively cold and afford natural protection against superheating of charging equipment; advantages of vertical ingot-heating over other rolling-mill furnaces include considerable saving in fuel, less space requirement, lower initial cost, etc.

G

GAS ENGINES

Efficiency. Study of Efficiency of Gas Engines (Etude sur le rendement des moteurs à gaz. Irrégularité de la pression d'alimentation), M. Laffargue. Revue de Métallurgie, no. 12, Dec. 1926, pp. 739–743, 2 figs. Results of tests on engine using blast-furnace gas, connected to alternator in power plant of large steel works, in order to determine necessity of regulating gas pressure, and to what extent; M.A.N. 2-cylinder engine was used in tests.

GAS PRODUCERS

Combustion Air, Additions to. Water Vapor vs. Combustion Gases as Addition to Air in Gas-Producer Practice (Wasserdampf oder Verbrennungsgase als Zusatz zur Vergasungsluft in Gasgeneratorbetrieb), R. Czerny. Feuerungstechnik, vol. 15, no. 2, Oct. 15, 1926, pp. 13–17, 6 figs. Points out importance of comparative investigation of gasification by means of vapor-air and flue gas-air mixtures; derivation of reaction equations for pure carbon with both kinds of gasification; composition of producer and combustion gases based on these equations; influence of superheating of vapor-air mixture; application of results to gasification of bituminous fuels.

Water-Vapor Decomposition. Recent Experience with Composition of Water Vapor in Gas Producers and Its Influence on By-Product Recovery (Neuere Erfahrungen und Erkenntnisse über die Zersetzung des Wasserdampfes im Gaserzeuger und ihren Einfluss auf die Nebenerzeugnis-Gewinnung), Gwosdz. Feuerungstechnik, vol. 15, nos. 4, 5 and 6, Nov. 15, Dec. 1 and 15, 1926, pp. 37–39, 52–55 and 63–67. Points out that high degree of vapor decomposition must not necessarily be accompanied by corresponding complete reduction of CO_2.

GAS TURBINES

Exhaust-Gas. An Exhaust-Gas Turbine. Gas & Oil Power, vol. 22, no. 257, Feb. 3, 1927, p. 99, 1 fig. Details of Lorenzen exhaust-gas turbine supercharger; in this design turbine rotor is utilized simultaneously also as impeller for compressing air, latter flowing through passages in turbine blades in radial direction.

GASES

Expansion. Curve of Ideal Expansion (Die Kurve idealer Ausdehnung), L. Schames. Physikalische Zeit., vol. 27, no. 19–20, Oct. 15, 1926, pp. 630–631, 2 figs. In the deduction of equation of state from specific heat, curve of ideal expansion of gas is important; from Amagat's measurements with hydrogen and Bridgman's data, curve of ideal expansion is shown to be hyperbolic; this result is discussed in its bearing on van der Waals' equation and law of corresponding states.

Temperature Measurement. Method of Measuring Gas Temperatures (Ueber ein Verfahren zur Messung von Gastemperaturen), H. Schmidt. Zeit. für technische Physik, vol. 7, no. 11, 1926, pp. 518–522, 8 figs. Method is applicable for temperatures up to 1100 deg. cent.; it makes use of a secondary heat source for thermometer and of increase of convective heat transmission by acceleration of gas current.

GASOLINE

Tests. Comparison of Gasolines by Analytical and Engine Tests, D. R. Stevens and S. P. Marley. Indus. & Eng. Chem., vol. 19, no. 2, Feb. 1927, pp. 228–231, 1 fig. 18 gasolines composed entirely of petroleum were analyzed for their content of paraffins, naphthenes, aromatics and unsaturated hydrocarbons according to method described by Egloff and Morrell; same gasolines were then tested for detonating tendency by engine test, using direct-reading detonation indicator; comparison of benzene equivalents calculated from analysis with those determined by engine tests shows that agreement is moderately fair for about half the fuels studied but rather wide discrepancies are found in other cases; recommends that fuels be studied for detonating tendency only by direct engine test.

Volatility. Modern Motor Fuels, W. A. Whatmough. Automobile Engr., vol. 17, no. 224, Jan. 1927, pp. 15–18, 7 figs. Comparison of volatility of gasolines of 1926 with one another and with motor fuels of four years ago.

GEAR CUTTING

Cutter Sharpener. Gleason 12-Inch Automatic Wet Cutter Sharpener for Spiral Bevel Gears. Am. Mach., vol. 66, no. 5, Feb. 3, 1927, pp. 233–234, 1 fig. Unit is completely self-contained and power for driving grinding wheel, table indexing mechanism, and water pump is supplied by three separate motors; grinding is performed on conical side of wheel 14 in. in diam., which is carried on ball-bearing spindle. See also description in Iron Age, vol. 119, no. 5, Feb. 3, 1927, p. 361, 1 fig.

Cutters, Manufacture of. Manufacturing Cutters for Gear Generators. Machy. (N. Y.), vol. 33, no. 6, Feb. 1927, pp. 410–412, 6 figs. Milling and grinding operations on cutters for Gleason machines.

Pfauter Process. Nature and Future Prospects of the Pfauter Process (Vom Wesen und Werden des Pfauter-Verfahrens. Beitrag zur Geschichte der Stirnrädererzeugung), K. Kutzbach. V.D.I. Zeit., vol. 71, no. 3, Jan. 15, 1927, pp. 73–80, 34 figs. Discusses six main possibilities of an arbitrary spur gearing

and underlying principles of cutting machines; timely development of helical-gear method; work of Schiele, 1856, Grant, 1887, and Pfauter, 1897; present significance of Pfauter process.

Sykes Generator. Sykes Improved Gear Generator. Am. Mach., vol. 66, no. 6, Feb. 10, 1927, p. 273, 1 fig. Changes and improvements made in design of Sykes gear generator to enable larger cuts to be taken and higher cutting speed to be obtained.

GEARS

Design Problems. Congress on Gear Science Held in Dresden, Germany, in October 1926 (Tagung für Getriebelehre in Dresden im Oktober 1926), W. Adrian. Zeit. für angewandte Mathematik u. Mechanik, vol. 6, Dec. 1926, pp. 487–494, 7 figs. Review of papers and discussion at session on pure and applied science of gears, dealing with present-day problems.

Grinding. Grinding Worms and Gears, H. R. Simonds. Abrasive Industry, vol. 8, no. 2, Feb. 1927, pp. 61–62, 3 figs. Irregularities due to warping in heat treatment are overcome by employing special machine which generates accurate lead.

Hardening. Hardening Gears with the Oxy-acetylene Torch. Acetylene Jl., vol. 28, no. 8, Feb. 1927, pp. 386–388, 1 fig. New method used in England, known as Shorter process, whereby maximum hardness can be imparted to wearing faces of gear-wheel teeth with minimum of distortion; it is claimed that with this process gears can be hardened without distortion.

Worm. Worm Reduction Units for Power Transmission, G. H. Acker. Indus. Engr., vol. 85, no. 1, Jan. 1927, pp. 6–8 and 11, 7 figs. Superiority of present over old-style worm gear is due to improvements in tooth and thread design, in addition to use of proper materials and workmanship, feature of modern worm-gear reduction unit is its ability to maintain its high efficiency throughout life; uses of worm-gear drives on great variety of machinery.

GOVERNORS

Turbine, Pneumatic. Principles of the Pneumatic Turbine Governor. Power Plant Eng., vol. 31, no. 3, Feb. 1, 1927, p. 186, 2 figs. Governor, which is made by Ridgway Dynamo & Engine Co., depends for its action on centrifugal force, set up in suitable enclosing housing by simple radial-bladed fan, mounted on end of main shaft.

Uses and Characteristics. Governors for Boiler-Feed Pumps, Engine Driven Fans and Centrifugal Pumps. South. Power Jl., vol. 45, no. 1, Jan. 1927, pp. 14–23, 29 figs. Various uses to which governors are put and characteristics of different designs.

GRAPHITE

Lubricant, Use as. Graphite as Lubricant (Graphit als Schmiermittel), H. Karplus. Maschinenbau, vol. 5, no. 24, Dec. 16, 1926, pp. 1122–1128, 3 figs. Points out importance of effective boundary-surface forces between metallic sliding surfaces and lubricants, and discusses measurement of these capillary forces; increase of lubricating efficiency by additions of graphite is explained with aid of new theories of friction, and calorimetric measurements of adhesion of oils on graphitic surfaces.

GRINDING

Machine-Shop Practice. Grinding—And Its Service to the World. Can. Ry. Club, vol. 25, no. 10, Jan. 1927, pp. 21–32 and (discussion) 32–43. Discusses problems in field of grinding relating to machine-shop practice.

GRINDING MACHINES

Centerless. Centreless Grinding Machines, J. Horner. Engineering, vol. 123, nos. 3183 and 3185, Jan. 14 and 28, 1927, pp. 36–37 and 93–94, 11 figs. Detroit grinding machines were first centerless grinders to be built, and differ from all subsequent designs in arrangement of wheels which are disposed in vertical relation; Heim and Coventry machines.

Sharpening Gear Cutters. Mounting and Sharpening Double-Helical Gear-Planer Cutters. Machy. (Lond.), vol. 29, no. 746, Jan. 27, 1927, pp. 556–558, 10 figs. J. Parkinson & Son, Shipley, have introduced vertical-spindle grinding machine, especially for sharpening cutters used in Sunderland double-helical gear-generating machines; it is a box-section pillar-type machine with large square base.

Spindle-Point. Spindle-Point Grinding Machine. Machy. (Lond.), vol. 29, no. 744, Jan. 13, 1927, p. 486, 2 figs. New type developed by H. Hunt & Sons, Manchester, for finishing and re-pointing ends of textile-machine spindles.

Time Charts for. Feed-and-Speed Chart for Circular Grinding Machines (Vorschläge zu einer Maschinenkarte für Rundschleifmaschinen), A. Raupp. Maschinenbau, vol. 5, no. 23, Dec. 2, 1926, pp. 1076–1084, 25 figs. Charts are developed which are said to overcome difficulties of determining time required for grinding; advantages of nomographic methods.

H

HAMMERS

Pneumatic. A New Pneumatic-Power Hammer, Single-Blow Type. Machy. (Lond.), vol. 29, no. 741, Dec. 23, 1926, pp. 396–397, 3 figs. Built by H. Hessenmüller Söhne, Ltd., Ludwigshafen-on-Rhine; has single hand lever both for continuous hammering and single blows.

Progress in Design of Pneumatic Hammers (Fortschritte im Lufthammerbau), M. Krohn. Glasers Annalen, vol. 50, nos. 1187 and 1189, Dec. 1, 1926, and Jan. 1, 1927, pp. 160–164 and 6–10, 25 figs. Discussion of different types and their developments; shows superiority of plunger principle; gives general theory of pneumatic hammer with criticism of different interpretations.

HEAT TRANSMISSION

Desuperheaters. High Heat-Transfer Rates for Surface Type Desuperheaters, P. H. Hardie. Power, vol. 65, no. 7, Feb. 15, 1927, pp. 253–255, 5 figs. Results obtained from tests conducted at Hudson Avenue station of Brooklyn Edison Co. indicate that transfer rate is extremely high for high velocities; factors affecting transfer rate.

HEAT TREATMENT

Developments. Recent Developments in Heat-Treating Equipment (Les progrès récents réalisés dans l'equipment des ateliers de traitement thermique), J. Galibourg and J. Cournot. Technique Moderne, vol. 18, no. 23, Dec. 1, 1926, pp. 737–750, 34 figs. Deals with new processes, including cementation by carbon, by aluminum, and by nitrogen; hardening; heat treatment of alloys of lead and antimony; brazing and soldering; gas and electric furnaces; automatic furnaces; apparatus for cementation and hardening; methods and equipment of control.

HEATING, HOT-WATER

Electric Boiler Plant for. Heating of Buildings with Electrically Heated Hot-Water Accumulators in Vienna, Austria (Eine Gebäudeheizung mit Elektro-Speicherbetrieb in Wien), A. Weindorfer. Elektro-Jl., vol. 6, no. 20, Oct. 25, 1926, pp. 387–390, 4 figs. Hot-water accumulator plant heated by electric boiler plant which has been in satisfactory operation since Nov. 1925; it results in uniform heating of building and has all advantages of low-pressure hot-water system.

HEATING, STEAM

Central. Heating Plant for Professional Schools of Northwestern University. Power, vol. 65, no. 6, Feb. 8, 1927, pp. 199–202, 6 figs. For various buildings on McKinlock campus a central plant has been provided to furnish steam for heating and ventilation, refrigeration, compressed air, water and other services.

HOBBING MACHINES

Pfauter Automatic. Pfauter No. 11 Automatic Horizontal Hobbing Machines. Am. Mach., vol. 66, no. 5, Feb. 3, 1927, p. 234, 1 fig. Designed for generating small spiral spindles, and spur and spiral gears; box column, knee and overhanging arm are of such ample proportions as to prevent vibration or distortion under even heaviest cuts; coolant tank is embodied in base of machine.

HOISTS

Electric. Control and Braking of Electric Hoists (Commande et freinage des appareils électriques de levage), M. Bizot. Electricien, vol. 43, no. 1413, pp. 49–55, 10 figs. Deals with automatic and hand brakes; electric rheostats and potentiometric brakes; induction motors.

HUMIDITY

Recorders. Some Recent Temperature and Humidity Recorders. Mech. World, vol. 81, no. 2090, Jan. 21, 1927, p. 47, 2 figs. Describes two instruments made by Negretti & Zambra, London, for recording changes in temperature and humidity.

HYDRAULIC TURBINES

Modern Design. New Hydraulic-Turbine Types (Neue Wasserturbinen-Konstruktionen), R. Dubs. Schweizerische Bauzeitung, vol. 88, nos. 25 and 27, Dec. 18 and 25, 1926, pp. 333–335 and 355–356, 19 figs., partly on p. 354. New types, all of which have been tested in turbine testing station of Escher Wyss & Co. in Zurich; account and results of tests; details of actual installations.

HYDRODYNAMICS

Equations. Experimental Solution of Hydrodynamic Equations, E. P. Hahn. Engineering, vol. 123, no. 3187, Feb. 11, 1927, pp. 178–180, 9 figs. Study of motion of fluid around vanes or through diffusers and wheels of turbine or pump; author has determined by direct experiment, electric equipotential lines in thin layer of electrolyte, arranging boundary conditions so as to correspond to different hydrodynamic problems; experimental study of any system of blades. Translation of paper read at Int. Congress of Tech. Mechanics, Zurich.

HYDROELECTRIC DEVELOPMENTS

British Columbia. The Water Power Developments of the Alouette-Stave-Ruskin Group of the British Columbia Electric Railway Company, Limited, E. C. Carpenter. Eng. Jl., vol. 10, no. 1, Jan. 1927, pp. 17–39, 16 figs. Alouette development; dam and spillway; Alouette tunnel, penstock, power station and transmission line. Stave Falls development: intake dam, west wing dam, main dam, penstocks, power house, tailrace, hydraulic and electrical equipment. Ruskin development: main dam, headrace, penstocks, power house and hydraulic and electrical equipment.

Canada. Hydro-Electric Progress in Canada During 1926. Can. Min. Jl., vol. 47, no. 6, Feb. 11, 1927, pp. 114–117. Developments in British Columbia, Alberta, Manitoba, Ontario, Quebec and Nova Scotia.

Progress of Hydro Development. Can Engr., vol. 52, no. 2, Jan. 11, 1927, pp. 127–128. Total hydroelectric installations now exceed 4,500,000 hp.; situation in various provinces; large projects planned.

Quebec. Developing Power on the Gatineau. Eng. News-Rec., vol. 98, nos. 4, 5 and 6, Jan. 27, Feb. 3 and 10, 1927, pp. 151–153, 194–198 and 234–241, 27 figs. Jan. 27: Initial 400,000-hp. hydroelectric development in Quebec. Feb. 3: Heavy hauling for dam building done by tractor trains. Feb. 10: Analysis of construction plant for 5 concrete dams.

HYDROELECTRIC PLANTS

Austria. Achen Lake Hydroelectric Plant (Das Achenseekraftwerk), E. Heller. Zeit. Oesterr. Ingenieur- u. Architekten-Vereines, vol. 78, no. 51–52, Dec. 24, 1926, pp. 509–514, 9 figs. Lake has natural storage capacity of 36,000,000 cu. m. with 5 m. lowering of lake level; net head fluctuates between 400 and 374 m.; details of reservoir, pressure conduit and power plant.

France. The Eguzon Hydro-Electric Station. Engineer, vol. 143, no. 3706, Jan. 21, 1927, pp. 64–67, 11 figs. partly on p. 76. While it is intended primarily for supplying motive power for electrified portions of Paris-Orleans Railway, it is also connected by high-pressure transmission lines with three other stations in neighborhood of Paris, and will consequently help to provide that city with electrical energy; power house has been constructed in what was originally bed of river immediately below dam, which is 61 m. high and which forms reservoir containing 54,000,000 cu. m. of water; there are two spillways; automatic weir consists of pivoted gate revolving on horizontal axis; there are two steel pressure pipes made of Siemens-Martin mild steel; equipment consists of five main turbines each of 15,000 hp. and each coupled direct to 12,500-kva. three-phase, 10,500-volt, 50-cycle alternator.

Pennsylvania. Cheat Haven Hydro-Electric Project, A. S. Park. Compressed Air Mag., vol. 32, no. 2, Feb. 1927, pp. 1915–1916, 4 figs. Compressed air played various important roles in construction of new 64,000-kw. hydroelectric plant of West Virginia Power & Transmission Co., at Cheat Haven, Pa.

Rack-Cleaning Machines. Machines for Cleaning the Gratings of Water Power Works. Eng. Progress, vol. 8, no. 1, Jan. 1927, pp. 18–19, 3 figs. Machines, made by firm of J. Voith, are of compact and light design necessitating only narrow platform to stand on, so that their application is possible even after completion of waterways; details of machines erected in Viereth power station on Main River.

Racks and Penstock Intake. Rack Structure and Penstock Intake of the Isle Maligne Hydro-Electric Power Station, W. S. Lee. Eng. Jl., vol. 10, no. 1, Jan. 1927, pp. 9–12, 7 figs. Features of design and construction of rack structure and penstock intake of plant of Duke-Price Power Co. on Saguenay River.

Switzerland. Hydroelectric Installation of Lake Lungern (Instalación hidroélectrica del lago Lungern), V. Gelpke. Ingenieria y Construccion, vol. 4, no. 47, Nov. 1926, pp. 497–506, 21 figs. Construction of works, as also restoration of Lake Lungern, Switzerland, to its primitive depth, which it retained until 1836, is being carried on in stages; for present there will be a dam 16 m. high and at altitude of 672 m., with useful storage capacity of 17,000,000 cu. m.; water runs from reservoir to compensation reservoir through tunnel built in 1836; and from compensation reservoir and engine house through two iron mains to Unter Aa works.

I

ICE PLANTS

Oil-Engine-Driven. Increasing Ice Plant Profits by Oil Engine Drive, E. J. Kates. Oil Engine Power, vol. 5, no. 2, Feb. 1927, pp. 82–87, 7 figs. Analysis of costs and conditions showing superiority of oil engine above other power sources.

IMPACT TESTING

Notched-Bar Tests. The Law of Similarity and the Notch-Bar Test (Das Aehnlichkeitsgefetz bei der Kerbschlagprobe), R. Mailänder. Kruppsche Monatshiefte, vol. 7, Dec. 1926, pp. 217–222, 9 figs. Results of tests show that if dimensions of notch are proportional to dimensions of cross-section, specific impact energy increases with increasing size of specimens; rule given by Moser that specific impact energy is independent of size of samples when samples have similar fracture profile and uniformly large notches, holds true only to limited degree; for tests with severing fractures, it does not hold true.

Repeated Impact. Study of Repeated Impact Tests (Contribution à l'étude des essais de chocs répétés), E. Duchemin. Revue de Métallurgie, no. 12, Dec. 1926, pp. 718–722, 3 figs. Influence of shape of notch; results of tests show that pointed notch and round notch have different effects on formation of crack, which is proportionally more rapid with pointed notch for equal number of blows; fatigue of metal under action of repeated blows (about 5000) does not seem to diminish by action of tempering.

INDICATORS

Explosion-Engine. The Optical Indicator as a Means of Examining Combustion in Explosion Engines, W. Morgan and A. A. Rubbra. Automobile Engr., vol. 17, no. 224, Jan. 1927, pp. 30–35, and (discussion) 36–38, 18 figs. Examines conditions prevailing in engine during initiation of ignition and combustion; with Watson-Dalby indicator, as used, measurements of mean effective pressure may be made with fair accuracy.

INDUSTRIAL MANAGEMENT

Educational Courses. Reorganization of Courses in Scientific Management at the Technical High School in Berlin (Die Neuordnung des wirtschaftswissenschaftlichen Unterrichts an der Technischen Hochschule zu Berlin), W. Prion. Technik u. Wirtschaft, vol. 19, no. 11, Nov. 1926, pp. 293–295. Cur-

riculum for engineers; special courses in economy and engineering.

Maintenance-Cost Control. How We Control Our Maintenance Costs, T. W. Suddard. Indus. Engr., vol. 85, no. 2, Feb. 1927, pp. 45–50, 5 figs. Plan in use at Hamilton Mfg. Co.'s plant is based on regular, systematic and thorough inspections of all machinery and equipment, and itemized reports of all maintenance and other costs for every foreman; these costs are also charted and compared with previous costs so that management can see trend at glance.

Minimum Manufacturing Cost, Determining. Minimum-Cost Point in Manufacturing, D. S. Kimball. Mfg. Industries, vol. 13, no. 1, Jan. 1927, pp. 21–24, 2 figs. Author gives simple formula for determining in advance total production for various conditions that might prevail.

Production Control. Daily Control of Production. Mfg. Industries, vol. 8, no. 1, Jan. 1927, pp. 11–14, 9 figs. Convenient and effective method of scheduling baking adopted by Loose-Wiles Biscuit Co. to meet each day's sales demand.

Production Control, C. G. Stoll. Mech. Eng., vol. 49, no. 3, Mar. 1927, pp. 201–211, 15 figs. How manufacturing department of company having 30,000 employees and annual output exceeding $150,000,000 in value and comprising some 13,000 kinds of apparatus, functions in control of production.

Profit Fixing. Selling Prices That Yield No Profit, W. L Churchill. Mfg. Industries, vol. 13, no. 1, Jan. 1927, pp. 15–18. Author shows some of common fallacies in regard to fixing profit, but condemns standard ratio of total costs, standard ratio per unit of product and flat discount; worked-out examples show impossibility of making profit under many applications of these methods; their use is one reason for small profits made by many manufacturers.

Progressive Assembly. Progressive Assembly Gains Wider Recognition, F. L. Eidmann. Factory, vol. 38, no. 2, Feb. 1927, pp. 270–272, 10 figs. Management's increased interest in flow of production and in elimination of pools of material between operations is reflected in application of progressive assembly to many new industries.

Replacing Obsolete Equipment. Factors That Determine Necessity for Replacing Obsolete Equipment, G. A. Van Brunt. Indus. Engr., vol. 85, no. 2, Feb. 1927, pp. 51–57. How replacement of equipment is handled in 7 industrial plants; manufacturer's viewpoint on replacement of equipment.

Research as Aid to. Management's Concern in Research, H. S. Person. Taylor Soc.—Bul., vol. 11, no. 5, Dec. 1926, pp. 261–267. Discussion of research as aid in establishing operating procedures, in making managerial decisions, and in developing science of management; methods of research in management.

Routing. Routing Diversified Work Through the Shop, E. B. Burke. Machy. (N. Y.), vol. 33, no. 6, Feb. 1927, pp. 435–437, 5 figs. System applicable to medium-sized shop building special machinery or doing jobbing business.

Time-Setting Charts. A New Method for Increasing Economy in Workshops (Ein neuer Weg zu planmässiger Steigerung der Werkstattwirtschaft), G. Peiseler. Maschinenbau, vol. 5, no. 24, Dec. 16, 1926, pp. 1115–1119, 8 figs. Recommends use of charts for measurement of piece-rate work, and points out that specially characteristic charts are obtained when relative movement between workpiece and tool in direction of clearance is entered as ordinates of time rates; describes shop instrument for making such records.

Time Study. See TIME STUDY.

INDUSTRIAL RELATIONS

Conciliation and Arbitration. The Conciliation and Arbitration of Industrial Disputes. Int. Labour Rev., vol. 14, nos. 5 and 6, Nov. and Dec. 1926, pp. 640–659 and 833–860, and vol. 15, no. 1, pp. 1–18. Nov.: Nature of conciliation and arbitration. Dec.: Examines critically various methods making up general machinery of conciliation and arbitration as actually in operation in various countries, and distinguishes as far as possible which of these methods would appear to be inherently sound. Jan.: Synthesis of certain methods of conciliation and arbitration which, in practice, appear to have given most satisfactory results.

INTERNAL-COMBUSTION ENGINES

Atomization. Determining the Efficiency of Atomization by Its Fineness and Uniformity, J. Sauter. Nat. Advisory Committee for Aeronautics—Tech. Memorandums, no. 396, Jan. 1927, 23 pp., 2 figs. Mixtures of air and atomized fuel in internal-combustion engines always contain drops of very different sizes; efficiency of fuel mixture is always increased: (1) by reducing mean size of drops, that is, by increasing fineness of atomization; and (2) by diminishing differences between sizes of individual drops, that is, by increasing uniformity of atomization; great differences may cause disturbances in flow and also in combustion of fuel mixture. Translated from Forschungsarbeiten auf dem Gebiete des Ingenieurwesens, no. 279, 1926.

Developments, 1926. The Internal Combustion Engine in 1926, W. A. Tookey. Gas & Oil Power, vol. 22, no. 256, Jan. 6, 1927, pp. 73–74. Review of developments, including high-speed engine introduced by A. G. Mumford; improved 2-cycle engine by Vickers-Petters; new vertical units of National Gas Engine Co., Michell crankless gas engine; developments by W. Beardmore & Co.; marine-engine progress; scientific research; fuel problems; Heat-Engine Trials Committee.

Electromechanical Valves. Electro-Mechanically Operated Valves on Internal Combustion Engines. Gas & Oil Power, vol. 22, no. 257, Feb. 3, 1927, pp. 97–99, 3 figs. Details of valve, invented by L. N. Bland, operated by electromagnetic action instead of conventional camshaft and tappets; it is usable with all types of internal-combustion engines, including Diesels; advantages claimed are elimination of cams, cam shafting and reciprocating parts; saving of frictional losses; positively reversible engine; elimination of carbonization and pitting of valves and seats; saving in initial costs of construction and assembling, and in weight of large-type engines; increased efficiency in power output, and simplicity of control.

Equilibrium Theory Applied to. Application of the Chemical Equilibrium Theory to the Theory of Internal-Combustion Engines (Die Anwendung der chemischen Gleichgewichtslehre auf die Theorie der Verbrennungsmotoren), Schmolke. Wärme, vol. 49, no. 49, Dec. 3, 1926, pp. 847–850. Critical discussion of new theory of internal-combustion engines developed by M. Brutzkus; suggestions for further development of this theory.

Gaseous Explosions. Gaseous Explosions, G. Granger Brown and G. B. Watkins. Indus. & Eng. Chem., vol. 19, no. 2, Feb. 1927, pp. 280–285, 5 figs. Effect of fuel constitution on rate of rise of pressure.

Slow-Combustion Fuels for. The Use of Slow-Combustion Fuels in Explosion Engines (Au sujet de l'emploi dans les moteurs à explosion de carburants peu inflammables), P. Dumanois. Académie des Sciences—Compt. Rendus, vol. 183, no. 25, Dec. 20, 1926, pp. 1261–1263. Results of tests in airplane engine using commercial product of petroleum paraffin called White Spirit, product remarkable for its homogeneity and distilling between 130 and 130 deg. cent.; rise from ground was made on gasoline and landing on White Spirit; most important advantage of this fuel lies in fact that it does not develop any inflammable vapors until temperature of 30 deg. cent. is reached; consideration of limit of proportion of heavy oils which such fuel can contain; it is proposed to call such fuel Safety Gasoline. See translation in Mech. Eng., vol. 49, no. 3, Mar. 1927, p. 264.

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; GAS ENGINES; OIL ENGINES.]

IRON

Aluminum Deposition on. Metal Coating with Aluminum (Das Alumetierverfahren), R. Hopfelt. Wärme, vol. 49, no. 52, Dec. 24, 1926, pp. 899–900, 2 figs. Points out possibility of annealing aluminum wire to 2000 deg. cent.; different methods of protecting iron against high temperatures by means of aluminum coating; application of metal-spray process; Alumetier process, developed by author, according to which metal in cold or slightly heated condition receives deposition of aluminum in any desired thickness; after drying of coated metal, it is annealed in furnace at temperature of 800 deg. cent., causing aluminum layer to penetrate into iron and iron into aluminum layer; process can also be employed for cast iron.

Direct-Reduction Process. Making Iron Without Coke at Minnesota Mines, E. W. Davis. Iron Trade Rev., vol. 80, nos. 2 and 3, Jan. 13 and 20, 1927, pp. 133–135 and 144, and 197–200, 5 figs. Result of experiments at School of Mines Experiment Station, Univ. of Minnesota; describes two-step process doing away with use of coke and using minimum of coal for direct reduction; while resulting product has been called pig iron, it is not pig iron as produced in blast furnace, because it contains only small fraction of per cent of silicon, perhaps 2 per cent carbon, and with sulphur and phosphorus both below 0.04 per cent; it is neither pig iron nor steel, within customary definitions.

Oxidation. Chemag Oxidation Processes for Iron and Steel. Engineering, vol. 123, no. 3187, Feb. 11, 1927, p. 163. Process invented by A. Mai. of Germany, for oxidation and coloration of iron and steel, consists essentially in immersing articles for periods varying from 5 to 30 minutes, in alkaline bath heated to temperature ranging from 120 to 200 deg. cent. when uniform tightly adherent film of oxide is deposited on surface; invention depends on discovery that presence of caustic alkaline earth exerts favorable influence on oxidation process.

IRON CASTINGS

Gasoline Engines. The Manufacture of Iron Castings for Petrol Engines, W. J. Molyneux. Foundry Trade Jl., vol. 35, nos. 543 and 544, Jan. 13 and 20, 1927, pp. 27–31 and 49–53, 33 figs. Explains methods commonly used in manufacture of such castings and shows novel devices of which author has made use during 10 years' experience. Coremaking; pouring cylinder castings.

Gates and Runners, Removal. A New Grinding Machine for Castings (Eine neue Gusstrennmaschine), U. Lohse. V.D.I. Zeit., vol. 70, no. 51, Dec. 18, 1926, pp. 1700–1702, 8 figs. Describes Mars machine and process for removal of risers, gates and runners from gray-iron and steel castings; disadvantages of older method; electrical equipment.

J

JIGS

Design and Use. Jigs and Special Tools, Indus. Mgmt. (Lond.), vol. 14, no. 1, Jan. 1927, pp. 30–32, 2 figs. Points which should be kept in view in design of jigs are: (1) lightness, combined with stability and durability, (2) fool-proof, to insure safety and accuracy; (3) rapidity in handling; (4) simplicity for cleaning; advantages of jigs; form of laying out estimates.

L

LATHES

Crankshaft. The Wickes Crankshaft Lathe. Automobile Engr., vol. 17, no. 224, Jan. 1927, p. 21, 2 figs. Semi-automatic duplex crankshaft lathe introduced by Wickes Bros., Saginaw, Mich.

Multiple-Tool. Multiple-Tool Lathe for the Automotive Industry. Eng. Progress, vol. 8, no. 1, Jan. 1927, p. 5, 3 figs. Arrangement of tool rests renders lathe specially suitable for turning pieces of relatively great length; headstock is driven by single pulley; long tool rest, serving exclusively for longitudinal turning, slides on vees of front bed.

Screw-Cutting. A New Automatic Screw-Cutting Lathe. Machy. (Lond.), vol. 29, no. 741, Dec. 23, 1926, pp. 385–387, 5 figs. Lathe designed by A. Hilger, Ltd., to cut screws of highest order of accuracy commercially attainable.

Turret. Bullard "Spiral Drive" Vertical Turret Lathes. Am. Mach., vol. 66, no. 5, Feb. 3, 1927, p. 228, 1 fig. Improved series supersedes previous "New Era" type and embodies several improvements including changes in material of construction, most notable being all-steel main slide and turret.

LIFTING MAGNETS

Iron-and-Steel Handling. Lifting Magnets for Handling Iron and Steel, C. H. S. Tupholme. Metal Industry (Lond.), vol. 30, no. 5, Feb. 4, 1927, pp. 145–146, 2 figs. Types of lifting magnets; method of mounting; capacity of crane; rectangular and circular magnets.

LIGHTING

Flood. Comparative Flood-Light Test, D. L. Bruner and W. T. Harding. Air Corps Information Cir., vol. 6, no. 571, Sept. 1, 1926, 13 pp., 21 figs. Object of test was to determine system of ground floodlight equipment best adapted for service use as night-flying equipment.

Industrial. Intensity of Light and Speed of Vision Studied with Special Reference to Industrial Situations, C. E. Ferree and G. Rand. Illum. Eng. Soc.—Trans., vol. 22, no. 1, Jan. 1927, pp. 79–110, 11 figs. Investigation to study effect of change of intensity of light over wide range on speed of vision, with regard to size of object and difference in coefficient of reflection between object and background; comparative benefits of increase of illumination at various points in intensity scale, relation of size of pupil to intensity of light and speed of vision, and comparison of more important features of curve representing changes of speed of vision with change of intensity of light for pupil of constant and of variable size.

LOCOMOTIVE BOILERS

Internal-Combustion. The Internal-Combustion Boilers and Its Application to the Locomotive Engine. O. Brumler. Ry. Gaz., vol. 46, no. 3, Jan. 21, 1927, p. 84. Proposal, based upon experiments and test installations, for which theoretical efficiency as high as 99 per cent is claimed.

LOCOMOTIVES

Clinker Removal from Fireboxes. Removal of Clinker from Locomotive Fireboxes. A. DePawlowski. Int. Ry. Congress Assn.—Bul., vol. 8, no. 12, Dec. 1926, pp. 1080–1083. Special devices for removal of clinker are divided into two groups: (1) shaking grates in which whole of bed of fire is from time to time given slight movement which gets rid of clinker; (2) certain sections of grate are arranged to tilt, thereby providing, when required, openings through which ashes and clinker can be pushed into ash pan; latter arrangement is suitable to all classes of coal and is widely used, especially in Europe.

Coaling Stations. Mechanically operated Locomotive Coaling Plant, L. M. S. R. Ry. Gaz., vol. 46, no. 3, Jan. 21, 1927, pp. 85–87, 3 figs. Plant enables 4 engines to be coaled simultaneously, while it has considerable storage capacity and includes several special features.

Cylinders. Heat-Exchange Loss in Locomotive Cylinders (Wärmeaustauschverluste in Lokomotivzylindern), F. Loewenberg. V.D.I. Zeit., vol. 71, no. 1, Jan. 1, 1927, pp. 15–19, 6 figs. Tests on German and American locomotives have been calorimetrically evaluated, and equations derived for determination of steam loss occurring with cooling off at admission; with sufficient superheating, degree of loss is shown to depend to great extent on speed and efficiency.

Fireless. Calculation of Fireless Locomotive (Die Berechnung feuerloser Lokomotiven), Wichtendahl. Organ für die Fortschritte des Eisenbahnwesens, vol. 81, no. 24, Dec. 30, 1926, pp. 506–512, 7 figs. Investigation of following questions: How much steam can be generated in hot-water accumulator by pressure reduction, and how much tractive effort can be obtained with steam generated.

Four-Cylinder. A Four-Cylinder Simple Express Passenger Locomotive. Ry. & Locomotive Eng., vol. 40, no. 1, Jan. 1927, pp. 1–2, 1 fig. New 4-6-0 type locomotive known as Lord Nelson.

Germany. Standardization, Interchangeable Manufacture and Quantity Production of Parts for Existing Locomotives of the German State Railway (Normung, Austauschbau und Massenfertigung bei den vorhandenen Lokomotiven der Deutschen Reichsbahn), D. Iitgen. Glasers Annalen, vol. 50, no. 3, Feb. 1, 1927, pp. 39–44, 8 figs. It is shown that by standardization of parts of existing locomotives, interchangeable quantity production of substitute parts is made possible, and by establishment of standard measuring system in repair shops, exchangeability of parts can be permanently maintained.

Internal-Combustion. The Internal Combustion Locomotive. Engineer, vol. 143, no. 3707, Jan. 28, 1927, pp. 96–97. In actual locomotives best-known practical examples are Lomonosoff designs for Russia; examples of hydraulic class are of smaller power, and are found in rail cars; they are of piston, turbo type or combined piston and gear type; combination systems using gaseous means for transmission; use of steam in conjunction with oil, as in Still engine; method of control.

Oil-Electric. Oil Electric Locomotives, F. H. Brehob. Purdue Eng. Rev., vol. 22, no. 2, Jan. 1927, pp. 10–11 and 32, 4 figs. There are two sizes in service; 60-ton unit using one Ingersoll Rand 300-hp., 600-r.p.m. 6-cylinder 4-cycle solid-injection engine as prime mover; and 100-ton locomotive, which is similar except that it is equipped with two 300-hp. generating sets, and with larger railway motors to take care of increased power and increased tractive effort.

Steam-Turbine. Turbine Locomotive for the German State Railways, G. J. Melms. Ry. Age, vol. 82, no. 4, Jan. 22, 1927, pp. 295–299, 3 figs. Pacific type for heavy express service to handle trains at average speed of 62 miles per hr., built by I. A. Maffei, Munich; turbine is situated above engine truck; two condensers are connected in parallel for both flow of steam and of water; cooling water flows in four streams; feedwater heater tanks are located in rear of condenser; new design of suction draft is provided.

Three-Cylinder. Three-Cylinder 2-8-0 Locomotive, Buenos Ayres Great Southern Railway. Ry. Gaz., vol. 46, no. 4, Jan. 28, 1927, pp. 114–115, 2 figs. Designed for heavy freight service, these engines have 2 cylinders actuating third coupled axle and one driving second, steel fireboxes and truck tenders, and are adapted for burning oil as fuel.

LUBRICATING OILS

Flash Points. Prediction of Flash Point of Blends of Lubricating Oils, E. W. Thiele. Indus. & Eng. Chem., vol. 19, no. 2, Feb. 1927, pp. 259–262, 2 figs. Method for making calculation, believed to be simple in application and sufficiently accurate for most practical purposes.

LUBRICATION

Mechanical System. Lubricating System. Iron Age, vol. 119, no. 6, Feb. 10, 1927, p. 416, 2 figs. Mechanical lubricating system designed for positive lubrication with solidified transmission oil from centrally controlled point.

M

MACHINE TOOLS

German, 1926. The German Machine-Tool Industry in 1926 (Rückblick auf die Werkzeugmaschinenschau 1926), M. Kurrein. Werkstattstechnik, vol. 20, no. 23, Dec. 1, 1926, pp. 685–716, 76 figs. Discussion of machine tools exhibited at Leipzig Fair 1926, and improvements in design, drive, tools and devices; turret and automatic lathes; drilling, milling and grinding machines, planers, etc.

Replacement Policy. What are the Reasons for Replacing Obsolete Equipment? Am. Mach., vol. 65, nos. 20, 22, 24 and 26, Nov. 11, 25, Dec. 9 and 23, 1926, pp. 775–777, 853, 935–936 and 1011–1012. Nov. 11: Reasons for replacing obsolete equipment. Nov. 25: Period of time in which new equipment should pay for itself. Dec. 9: Steps to be taken in buying equipment. Dec. 23: Group vs. individual motor drive.

MAGNESIUM ALLOYS

Founding. Magnesium (Le Magnesium), R. De-Fleury. Revue de Métallurgie, no. 11, Nov. 1926, pp. 649–657. Deals almost entirely with founding of magnesium and its alloys; in author's belief, chief difficulty to be overcome in exploitation of magnesium alloys for engineering lies in foundry, that is, in melting and preparation of alloys and in casting; chief difficulty in melting shop arises from great chemical activity of molten metal; contact with furnace gases must be rigorously avoided; problem of purification of melts and production of sound castings appears to have been most successfully solved in France by Michel (Société du Magnesium Industriel), which is also successfully producing forgings of various kinds; engineering practice tends more towards development of forged parts, whereas outside France, attention has centered on castings. See translated abstract in Metallurgist (Supp. to Engr.), Jan. 28, 1927, pp. 14–15.

MALLEABLE IRON

Manufacture. Manufacture of Malleable Iron, A. E. White. Am. Soc. Steel Treating—Trans., vol. 11, no. 2, Feb. 1927, pp. 245–263, 20 figs. Composition, physical properties, and structural constitution of malleable iron; sets forth results of numerous experiments in series of tables and shows, by means of photomicrographs, changes in structure of cast iron when brought to various temperatures; curves show graphical expression of time-temperature relations for equilibrium of cast iron of varied carbon and silicon content; author attaches much importance to cooling-down process; variation in time required to produce equilibrium in iron-carbon alloys of composition usually used in making malleable cast iron.

MATERIALS HANDLING

Progress, 1926. Material Handling's Progress During 1926, H. J. Payne. Factory, vol. 38, no. 1, Jan. 1927, pp. 156–157, 182, 184–186 and 188, 7 figs. Standardization of handling equipment was factor in year's developments, although in electric-truck business trend has been away from standardization in strict sense; in connection with hand- and power-lift trucks, Hunt's laws for effective handling are more and more being put into practice; improvements in conveyors; increasing use of gasoline-powered industrial trucks and tractors; growing number of trailer installations; developments in jib cranes.

Savings Effected by. Large Manufacturing Savings from Improved Material Handling, R. D. Chapin. Mfg. Industries, vol. 13, no. 2, Feb. 1927, pp. 89–92, 9 figs. Materials-handling equipment employed by Hudson Motor Car Co., which have contributed more than any other constructive measures to establishment of record of making more automobile engines per hour in given number of square feet of floor space than any other company in industry.

Steel Works. Modern Methods and Equipment for Handling Materials in Metallurgical Industry (Les procédés et appareils modernes de manutention), H. Drouot. Technique Moderne, vol. 18, no. 23, Dec. 1, 1926, pp. 707–714, 15 figs. Deals with blast-furnace chargers, aerial cableways, cranes and bridges; special apparatus.

METAL SPRAYING

Schoop Process. The Truth about the Metal Spray Process (Die Wahrheit über das Metallspritzverfahren), H. R. Karg. Zeit. für die gesamte Giessereipraxis (Metall), vol. 48, nos. 1, 2, 3 and 4, Jan. 2, 9, 16 and 23, 1927, pp. 1–3, 9–11, 13–14 and 17–18. Critical discussion of Schoop process; in author's opinion, process is a very expensive one.

METALLOGRAPHY

Microscopic Examination of Metals. Application of Microtome Methods to the Preparation of Soft Metals for Microscopic Examination, F. F. Lucas. Am. Inst. Min. & Met. Engrs.—Trans., no. 1654-E, Feb. 1927, 15 pp., 16 figs. Describes sectioning method for preparing soft metals for microscopic examination and illustrates its application; microtome method can be applied successfully to preparation of soft metals.

METALS

Cold Working of. Materials Employed in Working of Metals (Quelques nouveautés dans le travail à froid des métaux), J. Cournot. Technique Moderne, vol. 18, no. 23, Dec. 1, 1926, pp. 753–758, 9 figs. Advantages and disadvantages of lead addition before drawing; pickling; tempering; duplex and triplex plate; material employed in cold working; control of products.

Deformation. Hot and Cold Deformation of Metals (Ueber Warm- und Kaltverformung der Metalle), F. Sauerwald and H. Giersberg. Centralblatt der Hütten u. Walzwerke, vol. 30, nos. 47 and 49, Nov. 24 and Dec. 8, 1926, pp. 501–504 and 525–529, 13 figs. Investigation of spontaneous crystallization in connection with deformation at higher temperatures and relation of temperature to age hardening, with special consideration of time factor; results aid in establishing with greater accuracy relation between hot and cold deformation; crystallization and its relation to deformation temperature and time.

Endurance. The Endurance of Materials. Its Practical Importance and Its Determination by Means of New Types of Testing Machines (Die Dauerfestigkeit, ihre Bedeutung für die Praxis und ihre kurzfristige Ermittlung mittels neuartiger Prüfmaschinen), E. Lehr. Glaser Annalen, vol. 50, nos. 8, 9, 12, Oct. 15, Nov. 1, Dec. 15, 1926, pp. 109–114, 117–122, 177–180 and vol. 50, no. 3, Feb. 1, 1927, pp. 33–39, 26 figs. Examples are given of light engines, bridges, springs, ships, etc., to illustrate importance of endurance properties of materials; characteristics of fatigue phenomena; new methods and machines for observation of physical changes occurring at limit of fatigue, which permits determination of endurance properties of materials by means of rapid tests; machines have been developed thus far for tensile stress, bending and torsion; gives numerous results of tests.

Flow in. Testing Flow in Metals at Various Temperatures, L. W. Spring, H. W. Maack and I. Kanter. Power, vol. 65, no. 6, Feb. 8, 1927, pp. 205–208, 4 figs. Deals with new machines designed for accurate testing of flow or creep in metals in which test specimens are subjected to maintained high temperatures and pressures prevalent in modern practice; materials having tensile strengths up to 250,000 lb. per sq. in. may be tested.

Hardening. General Theory of Metallic Hardening, R. S. Dean and J. L. Gregg. Am. Inst. Min. & Met. Engrs.—Trans., no. 1644-E, Feb. 1927, 18 pp., 7 figs. Theory of hardening by binding of electrons at lattice discontinuities as proposed by Dean has been developed in considerable detail; authors' theory is that this binding of electrons results in formation of definite diatomic non-polar molecules.

Specific Heat. On the Latent Heat of Fusion of Several Metals and Their Specific Heats at High Temperatures, S. Umino. Tôhoku Imperial Univ.—Sci. Repts., vol. 15, no. 5, Nov. 1926, pp. 597–617, 11 figs. Gives melting point for iron, chromium, etc. (In English.)

Thermal Expansion. Influence of Working on Thermal-Expansion Coefficient of Metals (Einfluss der Bearbeitung auf den thermischen Ausdehnungskoeffizienten der Metalle), W. Jublitz. Zeit. für technische Physik, vol. 7, no. 11, 1926, pp. 522–527, 9 figs. Influence of plastic working, such as rolling, forging, drawing, etc., is investigated experimentally on number of metals; for metals belonging to regular system (bronze, low-carbon steel), no influence on expansion coefficients could be established; for metals that do not belong to regular crystal system (zinc, cadmium, magnesium), such influence was observed.

MILLING CUTTERS

Design. Modern Milling Cutters, S. H. Bailey. Machy. (Lond.), vol. 29, nos. 741 and 744, Dec. 23, 1926 and Jan. 13, 1927, pp. 401–404 and 476–479, 10 figs. Design and application. Dec. 23: Variations of tooth form; cutters with spiral or helical teeth; inserted tooth cutters. Jan. 15: Elimination of chatter marks; arbors and keys; mounting special steadies; work support; maintenance of cutters.

MILLING MACHINES

Planer-Type. "Hypro" Planer-Type Milling Machine. Am. Mach., vol. 66, no. 4, Jan. 27, 1927, pp. 189–190, 2 figs. Placed on market by Cincinnati Planer Co., Cincinnati, O.; table of box-type construction has been adopted to prevent distortion during operations on large castings.

Rigidmil. Sunstrand No. 5 Rigidmil. Am. Mach., vol. 66, no. 5, Feb. 3, 1927, pp. 227–228, 2 figs. Spindle head is mounted on wide slide, which has improved type of gib that is said to give solid metal support without dependence upon gib screws.

MOLDING METHODS

Chaplets for Heavy Castings. Chaplets for Heavy Castings, I. Lamoreux. Foundry Trade Jl., vol. 35, no. 546, Feb. 3, 1927, pp. 93–94, 7 figs. Proportions between dimensions of chaplets and those of casting should be fixed so as to effect compromise between strength of chaplet when it is supported by cast iron, and to prevent fracture of casting upon cooling; in castings subjected to hydraulic or other pressure, threaded chaplets are used, and in other castings, less expensive stud chaplets; it is useless and dangerous to try to weld chaplets, which cannot be joined except by considerably altering composition of metal. Paper submitted on behalf of Belgian Foundrymen's Assn. to Am. Foundrymen's Assn.

Large Castings. Molding of Cast-Iron Drum Making Use of Templet Boards and Loam Core in Three Sections (Die Herstellung der Form zu einer gusseisernen Trommel unter Benutzung von Schablonenbrettern und eines dreiteiligen Lehmkernes), R. Löwer. Praktischer Maschinen-Konstrukteur, vol. 59, no. 51/52, Dec. 25, 1926, pp. 589–591, 13 figs. Shows how mold and three-sectional loam core for large casting can be economically constructed with use of templet boards.

Ship's Stern Frame. Mold Stern Frame in British Shop, H. V. Fell. Foundry, vol. 55, no. 3, Feb. 1, 1927, pp. 90–95, 44 figs. Method used when molding large steel casting, serves to emphasize growing tendency of American and British foundry practice to drift apart; in England, pattern work is held to minimum; molder is expected to do nearly everything himself; time is not all-important fetish as in America; industrial conditions in American foundries have resulted in development of simplified practice.

Thicknessing. Some Thicknessing Jobs, B. Shaw and J. Edgar. Foundry Trade Jl., vol. 35, no. 543, Jan. 13, 1927, pp. 35–36, 9 figs. Thicknessing, in its application to molding, means use of some medium in mold or on core which will define thickness of metal which casting is required to have; gives practical examples.

Venting. Proper Venting Reduces Losses, P. R. Ramp. Iron Age, vol. 119, no. 5, Feb. 3, 1927, pp. 347–349, 5 figs. Cinder beds are used to advantage in molding pits; vent rod produces better vent than wire.

MOLDS

Skin-Drying. Skin-Drying Moulds, Mech. World, vol. 81, no. 2089, Jan. 14, 1927, p. 24, 4 figs. Purpose of skin drying is to give green-sand molds hard surface, almost without moisture; it is useful for light work; shows good method of drying green-sand molds in quantities.

MOTOR BUSES

Berlin, Germany. New Designs for Berlin Motor-Bus Transportation (Neukonstruktionen für den Berliner Omnibusverkehr), Quarg. Automobil-Rundschau, vol. 28, no. 18, Dec. 15, 1926, pp. 419–423, 3 figs. Review of recent innovations and plans for future improvements; at present only double-deck buses are being constructed; design has been decided on which seats 54 passengers, although width is only 2.34 m.; 4-cylinder engines are employed; details of coupling, gears, axles, brakes, tires and materials employed.

Chassis Developments. Graphic Review of Bus Chassis Development Since 1922, E. F. Theisinger. Bus Transportation, vol. 6, no. 2, Feb. 1927, pp. 66–71, 13 figs. Six-cylinder engines have increased in use from 7.6 per cent in 1922 to 75.6 per cent in 1927; nominal horsepower ratings have also increased; more than 50 per cent of current models use battery ignition; cast spoke wheels appear to be increasing in popularity; other improvements.

Large Bodies. Larger Bus Bodies. Bus Transportation, vol. 6, no. 2, Feb. 1927, pp. 75–77, 4 figs. Outstanding feature of 1926 body production is that potential carrying capacity of all bodies built is larger than for any preceding year, notwithstanding fact that lesser number of bodies was actually constructed; 29-passenger body of street-car type claims first place in production table; presents comparative table showing number of bus bodies, classified according to type and seating capacity, built in United States during 1924, 1925 and 1926.

MOTOR TRUCKS

Eadon. The Eadon "Six." Motor Transport, vol. 44, no. 1143, Feb. 7, 1927, pp. 143–145, 6 figs. 6-cylinder pneumatic-tired goods carrier for high-speed transport of 2 to $2^1/_2$-ton loads.

Paris Show. The 20th Automobile Show (Le 20th Salon de l'Automobile), C. Delanghe. Génie Civil, vol. 89, nos. 21 and 23, Nov. 20 and Dec. 4, 1926, pp. 445–453 and 504–512, 30 figs. Commercial and industrial cars and trucks exhibited, including Somula, Scemia, Panhard and Levassor, Unic, Latil, Saurer and other types; braking and general equipment gasoline and electric drive; transmissions; braking.

O

OIL ENGINES

Cold-Starting. A Cold-Starting Heavy-Oil Engine. Engineer, vol. 143, no. 3706, Jan. 21, 1927, pp. 80–81, 3 figs. Single-cylinder horizontal two-stroke-cycle type designed for output of 50 b.hp. when running at normal speed of 300 r.p.m.

Exhaust-Gas Utilization. The Use of Exhaust Gases in Two-Stroke Oil Engines (Die Abgasverwertung bei Zweitakt-Dieselmaschinen), M. Louis. Werft—Reederei—Hafen, vol. 7, no. 23, Dec. 7, 1926, pp. 576–578, 4 figs. First shows by calculation that heat in exhaust gases of two-stroke is insufficient for heating purposes; and then advances proposition that by reducing quantity of scavenge air of main engines, thereby increasing main engine consumption, it may yet be possible to reduce total consumption of engine and auxiliary boiler combined; this proposition is fully investigated and author suggests that by reducing excess air from 30 to 9 per cent this can be achieved. See brief translated abstract in Mar. Eng. & Motorship Bldr., vol. 50, no. 594, Feb. 1927, p. 78.

Operation. Problems Regarding Oil Engine Operation, D. I. Fagnan. South. Power Jl., vol. 45, no. 2, Feb. 1927, pp. 41–45. Discusses difficult problems confronting operators.

Solid-Injection. The Effect of Reduced Intake-Air Pressure and of Hydrogen on the Performance of a Solid Injection Oil Engine, G. F. Mucklow. Roy. Aeronautical Soc.—Jl., vol. 31, no. 193, Jan. 1927, pp. 17–48 and (discussion) 48–59, 16 figs. Deals with experiments carried out in engineering laboratories of Univ. of Manchester on Crossley engines in which small quantities of hydrogen or coal gas were introduced along with air supply to engine; maximum amount of hydrogen used was slightly more than 3 per cent; and in corresponding series of trials, using coal gas, maximum volume of gas employed was 5 per cent of air supply; it was shown that such quantities of hydrogen or coal gas can be used satisfactorily in type of engine considered.

OIL FUEL

Gasification. Gasifying Oil Fuels. Gas & Oil Power, vol. 22, no. 257, Feb. 3, 1927, pp. 101–102, 2 figs. Recent development known as Goldsbrough process, by which, it is claimed, fuel oils can be completely gasified.

OPEN-HEARTH FURNACES

Cooling. Cooling of Open-Hearth Furnaces (Die Kühlung von Siemens-Martin-Oefen), G. Bulle. Stahl u. Eisen, vol. 47, nos. 2 and 3, Jan. 13 and 20, 1927, pp. 41–52 and 85–90, 37 figs. Purpose of cooling; different arrangements and devices; heat requirement, durability and operating costs; advantages and disadvantages of cooling.

Design. Open Hearth Furnace Construction, C. W. Veach. Blast Furnace & Steel Plant, vol. 15, no. 2, Feb. 1927, pp. 92–93. It is desirable to know fusing point of various refractories entering into furnace construction; kind and quality of brick stressed; chrome ore used.

Developments. Developments in the Open-Hearth Process, B. M. Larsen. Blast Furnace & Steel Plant, vol. 15, no. 1, Jan. 1927, pp. 10–15, 1 fig. Review of furnace construction and operation; metallurgical practices (with chemical equations). Bibliography.

Water Cooling. Water Cooling of Open-Hearth Furnace Heads (Wasserkühlung an Siemens-Martin-Ofenköpfen), A. Ziegler. Stahl u. Eisen, vol. 47, no. 3, Jan. 20, 1927, pp. 98–99, 3 figs. Cooling system developed for 25-ton furnace at steel works in Röchling, Germany, and good experiences obtained therewith.

OXYACETYLENE WELDING

Impurities, Influence of. Influence of Oxygen and Acetylene Impurities on the Quality and Economy of Welded Seams (Einfluss der Verunreinigungen von Sauerstoff und Acetylen auf die Güte und Wirtschaftlichkeit der Schweissnaht), Streb. Autogene Metallbearbeitung, vol. 19, no. 23, Dec. 1, 1926, pp. 305–314 and (discussion) 314–320, 10 figs. Review of former experiments, and account of tests carried out by author; results show that when welding with standard equipment, such as are commonly used, impurity in oxygen up to 5 per cent plays no role; nitrogen content up to 5 per cent in oxygen and content of up to 0.007 H_2S and 0.02 PH_3 in acetylene has no influence on quality of welded seam.

Testing Welds. Testing Gas Welds, H. L. Whittemore. Welding Engr., vol. 12, no. 1, Jan. 1927, pp. 38–40. Review of present testing methods with suggestions for testing devices and further research in welding problems.

P

PATENTS

Application. Patent Application, E. L. Francis. Automobile Engr., vol. 17, no. 224, Jan. 1927, pp. 22–23. Comparison between procedure in Great Britain and United States.

Design and Mechanical. Design and Mechanical Patents, L. T. Parker. Machy. (N. Y.), vol. 33, no. 6, Feb. 1927, pp. 438–440. Distinction between these two classes and important facts about design patents.

PIPE, CAST IRON

Centrifugally Cast. Casts Pipe Centrifugally, E. C. Kreutzberg. Foundry, vol. 55, nos. 2 and 3, Jan. 15 and Feb. 1, 1927, pp. 49–51 and 102–104, 10 figs. Describes new de Lavaud plant at Burlington, N. J., located on Delaware River; it comprises 8 centrifugal machines, of which 5 are operated regularly, having total output of 1200 lengths of 4- to 12-in. pipe a day; 4 cupolas comprise present melting equipment.

Expansion Coefficient. The Expansion Coefficient of Cast Iron Pipe, T. W. Greene and E. Hering. Gas Age-Rec., vol. 59, no. 6, Feb. 5, 1927, pp. 187–188 and 196, 5 figs. Results of tests of underground steam line of 8-in. de Lavaud centrifugal cast-iron pipe with bronze welded joints.

PIPE LINES

Leaks, Determination of. Determination of Leaks in Pipe Lines for Air and Gases (Bestimmung der Undichtheiten in Rohrleitungen für Luft und Gase), J. Oelschläger. Wärme, vol. 49, no. 52, Dec. 24, 1926, pp. 895–898, 7 figs. Calculation of specific gravity and gas volumes at two points of measurement, between which leak has occurred; describes measuring instruments and new apparatus for determination of speed and volume.

PLANERS

Manufacture. Efficient Features in a Planer Plant. Machy. (N. Y.), vol. 33, no. 6, Feb. 1927, pp. 427–430, 10 figs. Points of interest in plant built by G. A. Gray Co.; how fatigue is reduced in scraping in and snagging operations; how chips are disposed of; construction of railway-car pits.

PLATES

Circular, Calculation. Circular Plate with Star-Form Rib System (Kreisplatte mit Rippenstern), M. Schilhansl. Zeit. für angewandte Mathematik u. Mechanik, vol. 6, no. 6, Dec. 1926, pp. 484–487, 1 fig. Method of calculating circular and annular plates, based on same principle as method of investigating elastic beams with multiple bearings.

POWER TRANSMISSION

Torque Converter. The Torque Converter, G. Constantinesco. Roy. Soc. of Arts—Jl., vol. 75, no. 3866, Dec. 24, 1926, pp. 148–170, and (discussion) 170–177, 13 figs. Details of machine in four dimensions developed by author; it produces instant and automatic torque always equal to resistance encountered while primary motor maintains its torque and speed nearly invariably; practical applications of machine and new possibilities opened up in application to a. c. motors, especially for electric motors where heavy tractive force is required at starting.

PRESSWORK

Pressures for. Pressures for Blanking, Punching, Drawing, etc., C. W. Lucas. Mech. World, vol. 81, no. 2091, Jan. 28, 1927, pp. 65–66, 6 figs. Determining shearing pressures; pressure requirements for gang punches; calculating drawing-die pressures. Paper presented before Nat. Pressed Metal Soc.

PULVERIZED COAL

Buell System. The Buell Pulverized Fuel System. Engineering, vol. 122, no. 3181, Dec. 31, 1926, pp. 813–816, 11 figs. Method known as Buell-Kek pulverized-coal burning system, originated in United States; special burner is employed to prepare fuel for efficient combustion before it enters combustion space.

PUMPING STATIONS

Providence Water Works. The Pumping Stations of the Providence, R. I., Water Works, J. A. McKenna. New England Water Works Assn.—Jl., vol. 40, no. 4, Dec. 1926, pp. 466–476, 3 figs. Water was first pumped into Sockanosset Reservoir in 1871; installation of first pumping engine designed by G. H. Corliss, in 1872; gives record of 10 pumping engines, covering period of 55 years.

PUMPS, CENTRIFUGAL

Accessibility of Parts. The Value of Accessibility, D. G. McNair. Colliery Eng., vol. 4, no. 35, Jan. 1927, pp. 23–24, 2 figs. Advantages of providing easy access to working parts of centrifugal pumps.

Design and Application. Recent Developments in the Design and Application of Centrifugal Pumps. Water & Water Eng., vol. 29, no. 337, Jan. 20, 1927, pp. 23–31. Discussion of paper by Hallam; published in vol. 27, p. 485, of same journal.

PYROMETERS

Radiation. The "Pyro" Radiation Pyrometer. Am. Gas Jl., vol. 126, no. 4, Jan. 22, 1927, pp. 84–85, 3 figs. Total-radiation type of pyrometer; fundamental principle is concerned with measurement of total radiant energy, emitted by hot body whose temperature is to be ascertained; instrument is of fixed-focus type.

R

RADIATION

Thermal, Measurements. The Thermoradiometer, M. Oyama. Elec. Jl., vol. 24, no. 1, Jan. 1927, pp. 26–29, 14 figs. Instrument to measure intensity of thermal radiation in same way as illuminometer is used to measure intensity of light; examples of its application.

RAILS

Corrugation. Effect of Abrasion and Compression on Rail Corrugation, Ch. Fremont. Elec. Ry. Jl., vol. 69, no. 7, Feb. 12, 1927, pp. 283–285, 8 figs. Energy that is stored by elastic deformation of axle causes distortion and consequent abrasion; compression causes structural changes in rail metal. Translated from Génie Civil, Nov. 13, 1926.

RAILWAY MOTOR CARS

Gasoline-Electric. Lehigh Valley Installs High Power Motor Cars. Ry. Age, vol. 82, no. 5, Jan. 29, 1927, pp. 353–357, 9 figs. Four Brill 500-hp. units with trailers replace steam locomotives in local train service; each plant consists of 250-hp. Brill-Westinghouse engine driving 600-volt 160-kw. Westinghouse generator through flexible coupling; cars are of all-steel construction.

New Double-Unit Gas-Electric Cars, J. G. Inglis. Ry. & Locomotive Eng., vol. 40, no. 1, Jan. 1927, pp. 4–6, 3 figs. Four Brill-Westinghouse 70-ft. 6-in. cars for Lehigh Valley Railroad, equipped with two 250-hp. 160-kw. units and electropneumatic control.

High-Power. High Power Motor Cars for Lehigh Valley. Ry. Elec. Engr., vol. 18, no. 2, Feb. 1927, pp. 56–59, 5 figs. Four 500-hp. gas-electric units with trailers replace steam locomotives in local train service.

RAILWAY OPERATION

Automatic Car Braking. Appliances for Braking Wagons in Marshalling Yards Controlled from a Distance, L. Cadis. Int. Ry. Congress Assn.—Bul., vol. 8, no. 12, Dec. 1926, pp. 1063–1073, 11 figs. Practice adopted by Midi Ry. Co., France; braking cars at top of hump and braking cars on sidings where they are usually stopped by hand brakes.

Car-Retarding System. Car Retarding Systems in Connection with the Operation of Hump Yards, W. B. Rudd. Ry. Club of Pittsburgh—Official Proc., vol. 26, no. 2, Dec. 23, 1926, pp. 29–34 and (discussion) 34–43. Car retarder for hump-yard operation stands out as remarkable achievement in effecting large economies and marked changes in yard-operating practices.

Train Control. Automatic Train Control, G. E. Ellis. New England Railroad Club—Proc., Dec.14,1926, pp. 181–219 and (discussion) 219–226, 6 figs. Review of developments; classification of train-control devices; specifications and requirements for automatic train-stop of train-control devices; inspections and approvals by Interstate Commerce Commission.

RAILWAY SIGNALING

Artificial Lights. Signaling with Artificial Light on the German State Railway (Ueber Lichttagessignale bei der Reichsbahn), Buddenberg. Licht u. Lampe, no. 23, Nov. 18, 1926, pp. 791–798, 22 figs. Describes methods being adapted in Germany; lens system has been worked out with considerable care, idea being to produce concentrated beam, readily visible to engine driver but not easily seen from other directions; hence use of special protecting screens; system being used on French railways is based on use of parabolic mirror in place of lens, but in author's opinion use of mirrors is attended with one drawback—that false signals due to images of sun are less easily avoided.

Automatic Block. Committee IV—Direct Current Automatic Block Signaling. Am. Ry. Assn., Signal Section—Proc., vol. 24, no. 3, Feb. 1927, pp. 420–429. D.c. vibrating highway crossing bell; minimizing effect of lightning and of foreign current on d.c. track circuits; prevention of sweating.

Committee VIII—Alternating Current Automatic Block Signaling. Am. Ry. Assn., Signal Section—Proc., vol. 24, no. 3, Feb. 1927, pp. 587–620. Rectifiers for signal systems; induction interference of a.c. circuits and supply lines for signals and train control with communication circuits; protection from lightning.

Crossing Protection. Unique Crossing Signals, J. A. Peabody. Ry. Age, vol. 82, no. 3, Jan. 15, 1927, pp. 233–234, 3 figs. City of DeKalb, Ill., in conjunction with Chicago & North Western has unique installation of crossing protection signals at point where two streets intersect at right angles with each other and at approximately 45 deg. with crossing of railroad.

Either Direction, in. Missouri Pacific Operates Trains in Either Direction on Both Tracks. Ry. Age, vol. 82, no. 4, Jan. 22, 1927, pp. 291–292, 6 figs. Light signals for right-hand and semaphores for left-hand running; written orders reduced.

Great Northern. Great Northern Concludes Extensive Signaling Program. Ry. Age, vol. 82, no. 2, Jan. 8, 1927, pp. 183–186, 9 figs. Installation on 2998 mi. includes latest type of equipment; saving made by unique automatic interlockings.

Interlocking. Committee II—Mechanical Interlocking. Am. Ry. Assn., Signal Section—Proc., vol. 24, no. 3, Feb. 1927, pp. 379–399. Requisites for mechanical interlocking machine; compensation of pipe lines for operation of mechanical units; mechanical interlocking machines.

Lenses and Reflectors. Lenses and Reflectors for Railroad Service, F. Benford. Gen. Elec. Rev., vol. 30, no. 2, Feb. 1927, pp. 102–104, 4 figs. Optics of Fresnel lenses; three types and their characteristics; rated according to merits; optics of special railroad-yard floodlight; high collecting and projecting efficiency obtained.

London & North Eastern Ry., England. The Re-Signalling of Cambridge Station, London & North Eastern Railway. Ry. Engr., vol. 48, no. 565, Feb. 1927, pp. 46–53, 17 figs. Two all-electric signal boxes have replaced 5 mechanical cabins; two long lengths of main line through station are signaled for either-direction movements and present interesting example of reversible working.

Special Layouts. Signaling Special Layouts, F. H. Bagley. Ry. Signaling, vol. 20, no. 2, Feb. 1927, pp. 49–56, 30 figs. Seaboard met local operating problems at certain places by modifying signal arrangement.

RAILWAY YARDS

D. L. & W., Binghamton, N. Y. Lackawanna

Builds New Yard at East Binghamton, N. Y., C. A. Dayton. Ry. Age, vol. 82, no. 3, Jan. 15, 1927, pp. 228–232, 7 figs. Yard consists of three westbound and three eastbound receiving tracks with total capacity of 607 cars, 17 classification trucks, with total capacity of 1288 cars, scale track and 6 repair tracks; enginehouse is built on arc of circle and has 15 stalls, each with length of 105 ft.; coal and ash-handling facilities; power plant and water facilities.

RAILWAYS

Train Resistance. Notes on Train Resistance, C. F. D. Marshall. Ry. Engr., vol. 48, no. 565, Feb. 1927, pp. 73–77 and 80, 6 figs. Supplementary notes to series of articles published in 1924 and subsequently issued in book form; effect of acceleration and gradients; resistance of engines.

REDUCTION GEARS

Heavy Service. New Reduction Gear Units for Heavy Service. Iron Age, vol. 119, no. 6, Feb. 10, 1927, p. 439, 1 fig. Use of 7½-deg. single helical gears and of Timken roller bearings are features of series of single reduction-gear units placed upon market by R. D. Nuttall Co., Pittsburgh; there are 6 units in series, designated as MS and MR, and they cover range of from 150 to 2000 hp.

REFRIGERANTS

Solid CO_2. Solid Carbon Dioxide a New Commercial Refrigerant, D. H. Killeffer. Indus. & Eng. Chem., vol. 19, no. 2, Feb. 1927, pp. 192–195, 2 figs. Advantage was taken of peculiarities of solid carbon dioxide by developing methods for its use as commercial refrigerant in competition with water ice.

REFRIGERATING MACHINES

Circulating Ammonia in. The Measurement of Quantity of Ammonia Circulating in Refrigerating Machines (Ueber die Messung umlaufender Ammoniakmengen in Kältemaschinen), R. Stückle. Zeit. für die gesamte Kälte-Industrie, vol. 33, nos. 11 and 12, Nov. and Dec. 1926, pp. 169–171 and 188–193, 6 figs. Describes various apparatus used for measuring, and experience therewith; results of tests with Glässel controller, and other instruments.

REFRIGERATING PLANTS

Brine, Influence of. Quality of Brine Influences Refrigerating Plant Records, F. P. MacNeil. Power, vol. 65, no. 6, Feb. 8, 1927, pp. 203–204, 1 fig. Error in specific heat or in number of gallons circulated will entail serious error in results desired; to determine specific heat and weight of brine circulated, knowledge of exact specific gravity is necessary; effect of viscosity; increase in power consumption of brine pumps, not alone from viscosity but from increased weight per gallon, is another factor to be considered.

REFRIGERATION

Carbon Dioxide. Use of the P-I Diagram for CO_2 Refrigeration, H. J. Macintire. Power Plant Eng., vol. 31, no. 3, Feb. 1, 1927, pp. 201–203, 1 fig. Lack of accurate knowledge regarding behavior of CO_2 throughout cycle has led many engineers to avoid it; P-I diagram has absolute pressure as ordinates and values of thermal potential.

Refrigerator Temperatures. Refrigerator Temperatures, J. E. Starr. Ice & Refrigeration, vol. 72, no. 1, Jan. 1927, pp. 86–87. Method of finding inside temperatures of refrigerators under atmospheric changes; effects of good insulation on amount of refrigeration required and on refrigerator temperatures; theory of ice-box construction as to heat transmission.

ROLLING MILLS

Beams. Material Flow in the Rolling of Beams, N. Metz. Blast Furnace & Steel Plant, vol. 15, no. 2, Feb. 1927, pp. 82–87, 38 figs. In order to determine flow of metal when being rolled, method has been devised in which threaded test pieces are imbedded in block of steel and this block rolled exactly as in practice. Translated from Stahl u. Eisen, Nov. 16, 1927, pp. 1577–1582.

Electric Drive. Hot Rolling, Electric Control of Rolling Mills (Le travail à chaud. Les méthodes actuelles de commande électrique des trains de laminoirs), J. Lévy. Technique Moderne, vol. 18, no. 23, Dec. 1, 1926, pp. 751–752, 4 figs. Discusses drives by d.c. and by a.c. motors.

Electrical Equipment. Electric Equipment for Steel Plants, A. F. Kenyon. Blast Furnace & Steel Plant, vol. 15, no. 1, Jan. 1927, pp. 37–39 and 46, 10 figs. Progress in design and construction of motors for driving mills of various types; equipment for mills at various steel plants.

Equipment. Improvements in Rolling Mill Equipment, F. C. Roberts, Jr. Blast Furnace & Steel Plant, vol. 15, no. 1, Jan. 1927, pp. 29–31, 6 figs. Factors controlling rolling-mill construction; changes to various types of mills indicate material advances; pilger mill attracting much attention.

Merchant Mill. New Merchant Mill Placed in Operation, C. Longenecker. Blast Furnace & Steel Plant, vol. 15, no. 1, Jan. 1927, pp. 16–19, 3 figs. Layout and operation of new 10-in. Morgan merchant mill; electrical and mechanical features.

Regrinding. Regrinding of Rolls (Das Schärfen der Walzen), A. Herrmann. Centralblatt der Hütten u. Walzwerke, vol. 30, no. 47, Nov. 24, 1926, p. 505, 2 figs. Details of patented machine designed by H. A. Wadrich, capable of producing angular, rhomboidal or undulatory edges.

Tube. American Rolling Mills for Manufacture of Tubes (Amerikanische Rohrwalzwerksanlagen), H. Koppenberg. Stahl u. Eisen, vol. 47, no. 1, Jan. 6, 1927, pp. 17–25, 22 figs. Outstanding features of American tube-making process; seamless tubes; butt- and lapped-welded tubes; methods and equipment of National Tube Co., Pittsburgh Steel Products Co., Timken Roller Bearing Co., Youngstown Sheet and Tube Co.

RUBBER

Lathe Work with. Lathe Work with Soft Rubber. India-Rubber Jl., vol. 73, no. 4, Jan. 22, 1927, pp. 11–13. General and practical account of lathe-work methods as applied to soft rubber articles.

S

SAND, MOLDING

Reclamation. Sand System Yields Economies, B. Finney. Iron Age, vol. 119, no. 6, Feb. 10, 1927, pp. 413–416, 7 figs. Conservation of floor space, reduction of labor costs and substantial saving in amount of new sand purchased each year, have been made possible in Lima plant of Ohio Steel Foundry Co. by successful operation of sand-reclaiming system; all handling of sand by hand has been eliminated and, aside from one minor operation, crane service in relation to sand handling has been made unnecessary.

SAWMILLS

Electric Drive. The Lay-Out of a Modern Saw Mill, M. Unterweger. Eng. Progress, vol. 8, no. 1, Jan. 1927, pp. 9–11. Advantages and disadvantage of individual, group and main drive.

Transportation in. Disposition of Transport in Saw Mills, U. Philipp. Eng. Progress, vol. 8, no. 1, Jan. 1927, pp. 14–16, 4 figs. Acceleration and mechanicalizing of transportation reduce total working expenses.

SAWS

Circular, Guarding. Guarding the Circular Saw, E. G. Sheibley and C. G. Chipchase. Nat. Safety News, vol. 15, no. 1, Jan. 1927, pp. 31–35, 7 figs. Present status of problem in California.

SEAPLANES

Civil. The Development of Civil Marine Aircraft. Instn. Aeronautical Engrs.—Proc., no. 20, 1926, pp. 7–29 and (discussion) 30–37, 14 figs. Deals solely with transport aircraft giving historical outline, review of aircraft already produced, with reference to power units, constructional methods and equipment, and discusses qualities essential to successful marine transport aircraft, with appreciation of present achievement; concludes that modern seaplane is worthy of greater consideration in air transport.

SMOKE

Abatement. Smoke Abatement in St. Louis, W. G. Christy. Power, vol. 65, no. 6, Feb. 8, 1927, pp. 197–198, 1 fig. Comprehensive campaign being carried on by Citizens' Smoke Abatement League; average soot fall for December found to be over 900 tons per sq. mi.; education and coöperation keynote.

SPRINGS

Spiral. Calculation of Round-Bar Spiral Springs (Berechnung der runddrähtigen Schraubenfedern), A. Raasch. Maschinenbau, vol. 5, no. 23, Dec. 2, 1926, pp. 1084–1088, 5 figs. Calculation is made with aid of chart containing calculated units of large number of spiral springs; examples are given showing process of calculation.

Testing. Spring-Testing Machines (Federprüfmaschinen), E. Irion. Organ für die Fortschritte des Eisenbahnwesens, vol. 81, no. 22, Nov. 30, 1926, pp. 443–444, 3 figs. Machine of very rugged design, with which it is possible to change with ease from one testing method to another; tensile, pressure or bending tests can be carried out directly without special preparation.

STANDARDS

German N.D.I. Reports. Report of the German Industrial Standards Committee (NDI-Mitteilungen), Maschinenbau, vol. 9, no. 24, Dec. 16, 1926, pp. 1151 and 1157–1162, 6 figs. Tentative standard sheets for methods of testing refractory materials and for ball races.

STEAM

High-Pressure. Recent Experiments on the Properties of Steam at High Pressures, H. L. Callendar. Roy. Soc. of Arts—Jl., vol. 75, no. 3870, Jan. 21, 1927, pp. 245–258, 7 figs. Measurement of pressure; critical temperature and volume; adiabatic equation for dry steam; total heat of water and steam; specific heat of superheated steam.

High Pressures and Temperatures. The Use of Very High Steam Pressures and Temperatures. Eng. & Boiler House Rev., vol. 40, no. 8, Feb. 1927, pp. 384–386, 1 fig. New data from Continent of great importance to boiler house.

Research. Progress in Steam Research. Mech. Eng., vol. 49, no. 2, Feb. 1927, pp. 160–163, 6 figs. contains following contributions; Report on Progress in Steam Research at the Massachusetts Institute of Technology, L. B. Smith; Report on Progress in Steam Research at the Bureau of Standards, E. S. Mueller; Work on Pressure Standard at Massachusetts Institute of Technology, F. G. Keyes; Comparison with Formulations, R. C. H. Heck.

STEAM ENGINES

Bauer-Wach. The Bauer-Wach Combination Steam Engine. Shipbldr., vol. 34, no. 197, Jan. 1927, pp. 16–17, 1 fig. Describes installation on trawler Sirius and on steamship Elberfeld; propelling machinery consists of triple-expansion reciprocating engine, and waste-steam turbine which is placed directly abaft low-pressure cylinder and above main shafting; toothed gearing employed is of double-reduction type; it is claimed that system will result in notable increase in power when applied to any existing reciprocating-engined vessel.

Water Entry into Cylinders. Preventing the Entry of Water into Engine Cylinders, I. L. Kentish-Rankin. Steam Power, vol. 6, no. 1, Jan. 1927, pp. 5–6, 8 and 14, 4 figs. Precautions in starting up and in shutting down; backing up from exhaust; problem of surface condenser; claims that steam separator is no more dependable than its trap.

STEAM GENERATORS

La Mont. The La Mont Steam Generator. Boiler Maker, vol. 27, no. 1, Jan. 1927, pp. 22–23, 1 fig. Outstanding feature is method adopted for allowing film of water to flow through water tubes; during process part of this water is turned into steam.

STEAM METERS

Flow Meters. Using Meters Improves Efficiency and Reduces Investments, H. W. Gochnauer. Power, vol. 65, no. 4, Jan. 25, 1927, pp. 118–121, 6 figs. In author's plant, steam flow meters were installed in 1921; by using information made available by these meters, it has been possible to increase boilers' rating greatly and at same time improve evaporation per pound of coal on average of about 33 per cent.

STEAM PIPES

Expansion Joints. The Luc Denis Expansion Joint. Engineering, vol. 123, no. 3183, Jan. 14, 1927, p. 37, 2 figs. With this joint, which has come into extensive use in France, expansion of adjacent pipes is provided for by rotary movement of pair of flanges, which are coupled together, pipes joining limbs of lazy-tongs arrangement.

STEAM POWER PLANTS

Cost System for. A Cost System for Steam Power Plants, P. S. Austen. Mfg. Industries, vol. 13, no. 1, Jan. 1927, pp. 45–48, 2 figs. Practical system which is adaptable to both small and large-scale operations.

Economics. Economics of Electric Power Stations (Elektrische Kraft- und Wärmewirtschaft. Abfall- und Ueberschussenergie), F. Niethammer. Wärme, vol. 49, nos. 48 and 49, Nov. 26 and Dec. 3, 1926, pp. 831–836 and pp. 851–855, 4 figs. Presents leading data concerning number of largest steam turbo-electric sets in world, together with information concerning their performance and conditions of service; similar particulars are given concerning water-power plants with thermal prime movers as stand-by; use of thermal storages is discussed, also operation of generators on light load for purposes of power-factor improvement; examples of high-level hydraulic storage; wherever steam is required for heating or process work, back-pressure turbines should be employed, any deficiency of electrical energy being then purchased from public supply systems; plant-layout diagrams and operating data for number of combined power and heating installations in sugar factories, paper mills, textile factories, chemical works, mines, naphtha plants and cement mills.

High-Pressure. The Use and Economy of High-Pressure Steam Plants, A. L. Mellanby and W. Kerr. Engineering, vol. 123, nos. 3185 and 3186, Jan. 28 and Feb. 4, 1927, pp. 117–120 and 149–151, 16 figs. High-power land plants; industrial power and process plants; marine steam plants; steam locomotives; main influences of high steam conditions; changes in boiler practice; turbines; steam cycle and its probable limits. See also Engineer, vol. 143, nos. 3707, 3708 and 3709, Jan. 27, Feb. 4, and 11, 1927, pp. 107–109, 126–128 and 166–168, 16 figs. Paper read before Instn. Mech. Engrs.

Power and Heating Requirements. The Relation between Power and Heating Requirements in Power Plants, C. L. Hubbard. Nat. Engr., vol. 31, no. 2, Feb. 1927, pp. 45–50, 4 figs. Several methods suggested for improving heat balance in various cases for most efficient utilization of exhaust steam and greatest overall economy.

Textile Mills. Reorganizing Textile Mill Power Plants, D. D. Eames. Textile World, vol. 71, no. 6, Feb. 5, 1927, pp. 157–158, 2 figs. Examples of work that has been done; influence of draft on boiler-plant revamping; changing from oil to coal fuel and place of pulverized coal; utilization of waste heat in form of exhaust steam and condensing water; tests and reports.

STEAM TURBINES

Back-Pressure. An Improved Back-Pressure Turbine. Engineer, vol. 143, no. 3705, Jan. 14, 1927, p. 56, 4 figs. partly on p. 46. Designed and built by English Elec. Co. for Dhrangadhra State Chemical Works, machine exhausts against back pressure of 30 lb. per sq. in. and is designed to give output of 675 kw. at speed of 3000 r.p.m.

Bleeder. Calculating the Characteristics of the Extraction Turbine, R. R. Walden. Power, vol. 65, no. 5, Feb. 1, 1927, pp. 170–172, 1 fig. Why an extraction turbine has greater throttle flow; selecting bleeding stages; determining increase in throttle flow to offset steam bled; proportion bled for feed heating; effect of extraction on steam rate and efficiency.

Steam Turbines (Turbines à vapeur), A. Cordier. Assn. des Ingénierus sortis de l'École Polytechnique de Bruxelles—Bul. Technique, vol. 22, no. 3, 1926, pp. 97–116, 5 figs. Reheating of feedwater by steam bleeding.

Design and Efficiency. Conversion of Steam Heat into Work by Means of Steam Turbine (Die Umsetzung der Dampfwärme in Arbeit durch Dampfturbinen), H. Koschmieder. Wärme, vol. 49, no. 44, Oct. 29, 1926, pp. 772–775, 5 figs. Discussion of live power in water and steam; comparison of hydraulic and steam turbines; speed of revolution; superheated steam; loss of live power; how to determine efficiency of turbine.

Improving Efficiency. Increasing the Efficiency

of Old Turbine Plants (Die Erhöhung der Wirtschaftlichkeit von Dampfturbinenanlagen), C. Körfer. Glückauf, vol. 62, no. 50, Dec. 11, 1926, pp. 1651–1654, 5 figs. Without increasing boiler pressure and temperature, and without altering condensing plant and electric generators, or making extensive alterations to foundations, overall efficiency can be raised considerably, either: (1) by reblading turbine if it is a 3000-r.p.m. machine; (2) by replacing a 1500-r.p.m. turbine by modern high-speed machine, using reduction gearing so that old generator may still be employed; tables of cost and steam-consumption data; other conversion possibilities include use of superheated steam and use of turbo-generators for power-factor improvement. See brief translated abstract in Power Engr., vol. 22, no. 251, Feb. 1927, p. 74.

Large. A New High-Speed Giant Turbine. Eng. Progress, vol. 8, no. 1, Jan. 1927, p. 25, 2 figs. New type of super-turbine developed by Waggon- & Maschinenbau A.-G., low-pressure part of which is subdivided three to six times without employing more than one low-pressure casing.

Progress in. Progress in Economy of Turbine Machinery on Land and Sea, C. A. Parsons and R. J. Walker and S. S. Cook. Engineer, vol. 143, no. 3706, Jan. 21, 1927, pp. 69–71, 3 figs. Abstract of paper presented before North-East Coast Instn. of Engrs. and Shipbldrs. See also editorial comments, pp. 77–78.

STEEL

Austenitic Structure. The Decomposition of the Austenitic Structure in Steels, R. L. Dowdell and O. E. Harder. Am. Soc. Steel Treating—Trans., vol. 11, no. 2, Feb. 1927, pp. 217–232, and 338, 31 figs. Decomposition of austenite during quenching; study is made under two headings: (1) ordinary quenching conditions and (2) special consideration of high stresses produced during quenching.

Bolt. Investigation of Bolt Steels, V. T. Malcolm and J. Juppenlatz. Am. Soc. Steel Treating—Trans., vol. 11, no. 2, Feb. 1927, pp. 177–216 and 299, 40 figs. Results of investigations of bolts and bolt materials obtained after several years of study, covering tests upon failures under actual working conditions, remedies and recommendations; not only heat treatment, physical tests and chemical analysis of raw material are important, but method of manufacture, rigid inspection and safeguards are specially necessary for highly or heavily stressed parts; recommends heat-treated alloy steel bolt to supplement carbon steel bolt and gives results of tests upon both of these materials; modern testing methods, with special reference to methods of high-temperature short and long-time testing; test data and charts pertaining to bolt material; in author's opinion, all advantages claimed for case-hardened nuts may be had without bad effect by use of medium-carbon heat-treated steel nut. Bibliography.

Brittleness. On the Impact Test of Steels at Low Temperatures, R. Yamada. Tôhoku Imperial Univ.—Sci. Reports, vol. 15, no. 5, Nov. 1926, pp. 631–659, 22 figs. For investigation of brittleness of steels, single bending and tension impact test and repeated impact test were made; materials tested were plain carbon and alloy steels with pearlitic and sorbitic structures; brittleness increases generally with fall of temperature and steels with sorbitic structure are much tougher than those with pearlitic structure at all temperatures; tested in annealed condition, steels alloyed with nickel and chromium are tougher than plain carbon steels, and increase in brittleness with fall of temperature is comparatively slight. (In English.)

Carburized vs. Cast. Wear Resistance of Carburized Steel Versus Cast High Manganese Steel, W. J. Merten. Am. Soc. Steel Treating—Trans., vol. 11, no. 2, Feb. 1927, pp. 233–244, 7 figs. Experiments to determine comparative wear resistance of 14-per cent manganese cast steel and case-hardened steel when subjected to relatively high pressure with movements free from shock or pounding; plastic flow under heavy pressure, during gliding motion, is apparently cause of considerable abrasion on manganese steel while it has decidedly less influence upon case-hardened steels.

Case-Hardened. Gas Cementation and Its Influence on Core Properties in Case-Hardened Steels (Die Gastiefenzementation und ihr Einfluss auf die Eigenschaften des Kernes im Einsatz gehärteter Stähle), W. Rohland. Stahl u. Eisen, vol. 47, no. 2, Jan. 13, 1927, pp. 52–57, 4 figs. Results of cementation tests on two carbon steels and chrome-nickel steel in coal-gas atmosphere; influence of different temperature and duration of cementation on its depth; coarsening of grain; core strength and structure; most suitable heat treatment.

Cold-Drawn. Volumetric Changes in Steel with Cold-Drawing (Volumenänderungen von Stahl beim Kaltrecken), E. Houdremont and E. Bürklin. Stahl u. Eisen, vol. 47, no. 3, Jan. 20, 1927, pp. 90–93, 3 figs. Importance of volumetric change in Maurer hardness theory; volume change in hardened and cold-drawn steels in relation to degree of deformation; points out that there is no absolute relationship between increase in strength and decrease in density; stress distribution with hardening and cold drawing; results of extended drawing tests.

Fatigue. The Variation in the Fatigue Strength of Metals When Tested in the Presence of Different Liquids, G. D. Lehmann. Engineering, vol. 122, no. 3181, Dec. 31, 1926, pp. 807–809, 7 figs. Results of research by Engineering Laboratories, Oxford, published by permission of Engineering Research Board; it appears that hot aqueous solutions of sodium chloride, ammonium salts (excepting nitrate), sodium nitrate and ammonium hydroxide at 17 deg. cent. show no cracking action on stressed steel, while hot sodium nitrate solution causes fractures similar to those caused by ammonia, ammonium salts, mercuric and mercurous salts in brass; lubricating oil at 17 deg. cent. produces no change in fatigue strength.

Solidification. Solidification of Steel in the Ingot Mold, A. L. Field. Am. Soc. Steel Treating—Trans., vol. 11, no. 2, Feb. 1927, pp. 264–275 and (discussion) 276 and 338, 1 fig. Linear rate of solidification and location and shape of shrinkage cavity, with certain simplifying assumptions, are treated mathematically; from this standpoint, methods employed are capable of further development to apply to actual mold practice, provided some of physical properties of steel and mold material (cast iron) at high temperatures are determined experimentally; in case of steel poured at its melting temperature, maximum rate of solidification is shown to be inversely proportional to square root of elapsed time, measured from moment of contact between liquid steel and mold wall, and distance through which solidification has progressed directly proportional to square root of elapsed time; effect of degree of superheat above melting temperature and of mold-wall thickness upon solidification rate.

Stainless. Stainless or Non-Corrosive Steel, A. C. Jebens. Eng. Progress, vol. 8, no. 1, Jan. 1927, pp. 23–24, 5 figs. Firm of Krupp manufactures two kinds of stainless steel; first group shows properties resembling those of chromium-nickel steel; percentage of chromium is about 13 to 15 per cent with small addition of nickel; these steels can be magnetized and their designation is VM; second group comprises so-called VA steels that cannot be magnetized; they are characterized by their exceedingly high resistance to corrosive processes of every description as well as their great welding strength.

STEEL, HEAT TREATMENT OF

Carbonizing. Comparative Carbonizing Costs. Gas Age-Rec., vol. 59, no. 1, Jan. 1, 1927, pp. 21–22. Gas-fired rotary carbonizing machines vs. oil-fired oven-type semi-muffle furnaces.

STELLITE

Welding, Application to. Stelliting: A New Welding Process, A. V. Harris. Mech. Eng., vol. 49, no. 2, Feb. 1927, p. 123. "Stelliting" is neither welding nor brazing in ordinary sense of works; it calls for blowpipe flame which contains fairly large excess of acetylene to lower flame heat and to exclude as much atmospheric oxygen as possible; surface of base metal to which stellite is to be applied is brought up to such a heat that it just begins to sweat and assume oily appearance.

STOKERS

Relation to Boilers. Relation of Stokers to Boilers, W. A. Shoudy. Mech. Eng., vol. 49, no. 3, Mar. 1927, pp. 212–218, 7 figs. Early attempts to improve combustion; heat-absorbing surfaces; per cent of rating; operating difficulties; selecting correct boiler and stoker for given condition.

SUPERPOWER

Plant Location and. Superpower, What It Means to Manufacturing Costs, W. S. Murray. Factory, vol. 38, no. 2, Feb. 1927, pp. 266–269, 3 figs. Points out that power is magnet which attracts industries to centralized locations; superpower is making new locations available for industrial development; high-potential transmission lines across country are forerunners of factories.

T

TAPPING MACHINES

Automatic. Gisco Automatic Tapping Machine. Am. Mach., vol. 66, no. 5, Feb. 3, 1927, pp. 229–230, 1 fig. Operation is fully automatic, tap being fed into work to predetermined point, reversed, and backed to starting point when its direction of rotation is again reversed and tap fed down.

TESTS AND TESTING

Fatigue. Design of Specimens for Short Time "Fatigue" Tests, L. B. Tuckerman and C. S. Atchinson. Diesel Oil Engine Jl., vol. 2, no. 6, Jan. 1927, pp. 25–28, 10 figs. Discusses controlling factors in design of short-time fatigue-test specimens which differ from those of endurance-run type of fatigue tests; load-deflection and load-temperature rise methods of tests promise to be of value for limited classes of material; Sondericker type of rotating-beam fatigue machine with plain cylindrical specimen or specimen with slightly reduced cylindrical section between load bearings seems best suited for these tests.

TEXTILES

Yarns and Threads. Yarns and Threads and Miscellaneous Spinning Accessories and Processes and Treatment of Fibers. Abridgments of Specifications, class 120 (iii), period 1916–20, 1926, 48 pp. Patents for inventions.

TIME STUDY

Railway Operation. Mechanization of Work and Time Studies in Railway Operation (Ueber Mechanisierung von Arbeits- und Zeitstudien im Eisenbahnbetriebsdienste), Frohne. Organ für die Fortschritte des Eisenbahnwesens, vol. 81, no. 23, Dec. 15, 1926, pp. 490–494, 7 figs. Points out that saving in costs and increase in accuracy can be effected by mechanization, and describes time clock developed for this purpose.

TRACTORS

Caterpillar. Caterpillar Tractors, W. A. Capron. Army Ordnance, vol. 7, no. 4, Jan.-Feb. 1927, pp. 273–279, 11 figs. Methods and equipment of Caterpillar Tractor Co. having its main plant at San Leandro, Cal., with factory branch in Peoria, Ill.

TUBES

Seamless. Oil Industry and Production of Seamless Tubes in the United States (Oelindustrie und Erzeugung nahtloser Rohre in den Vereinigten Staaten), F. Rosdeck. Stahl u. Eisen, vol. 47, no. 1, Jan. 6, 1927, pp. 9–17, 20 figs. Oil production in United States; different types of tubes employed in oil industry; most important tube-making processes; comparison of American and European method; probable trend of development in American tube rolling mills.

V

VAPORS

Pressure Measurement. An Improved Dynamic Method for Measuring Vapor Pressures, J. N. Pearce and R. D. Snow. Jl. Phys. Chem., vol. 31, no. 2, Feb. 1927, pp. 231–245, 3 figs. Describes apparatus and its technique which greatly improves dynamic method and eliminates many, if not all of difficulties experienced in the past; instead of measuring volume of air which passes through solution, hydrogen and oxygen are generated electrolytically, and volume of mixed gases is calculated from weight of silver deposited in coulometer.

VARNISHES

Driers, Influence of. Influence of Driers on the Properties of Some Ester Gum and Synthetic Resin Varnishes, G. G. Sward and H. A. Gardner. Am. Paint & Varnish Mfrs.' Assn.—Cir., no. 301, Feb. 1927, pp. 135–148, 1 fig. Results of investigation show that kind and concentration of drier has influence on properties of varnish; it is even possible to prepare some types of varnishes without driers; large amounts of any kind of drier do not accelerate drying of varnish to any marked extent; lead or cobalt driers are suitable for enamels.

VIBRATIONS

Continuous Motion Produced by. Continuous Motion Produced by Vibration, W. B. Morton and A. McKinstry. Phys. Rev., vol. 29, no. 1, Jan. 1927, pp. 192–196, 2 figs. Calls attention to number of cases in which precise mechanism is obscure; simple form of phenomenon occurs when mass is made to slip along rough inclined plane, without loss of contact, by making plane oscillate; it is found that motion may be either upward or downward, according to relation between direction of oscillation and inclination of plane.

W

WAGES

Incentives. High Productivity and Incentive Wage Payment Go Together. Mfg. Industries, vol. 13, no. 1, Jan. 1927, pp. 35–36. Gives data showing extent to which incentive wage-payment methods are in use, and data on relation between increase in productivity and method of wage payment, from which it is concluded that not only is there relationship between increase in production and adoption of incentive wage system, but also between latter and earning of profits.

Overtime Will Defeat Purpose of Incentive Wage Plans, L. A. Sylvester. Mfg. Industries, vol. 13, no. 1, Jan. 1927, pp. 31–35, 6 figs. Results of study to determine how workers should be paid in incentive wage plans when they are required to work beyond their normal working day; current practice of 20 large plants in regard to overtime; policy adopted by Atlantic Refining Co., based upon fundamental fact that efficiency declines very rapidly on overtime.

WELDING

Autogenous. See AUTOGENOUS WELDING.

Cast Aluminum. How to Weld Cast Aluminum. Diesel Oil Engine Jl., vol. 2, no. 6, Jan. 1927, pp. 39–41, 8 figs. Methods which have been successfully used in repair shops and foundries.

Electric. See ELECTRIC WELDING, ARC; ELECTRIC WELDING, RESISTANCE.

English Practice. English Welding Practice, P. L. Roberts. Welding Engr., vol. 12, no. 1, Jan. 1927, pp. 32–33. Publicity methods have gained wider adoption of welding in America than in England; applications of processes compared.

Filler Rods. Properties of Steel Filler Rods for Welding. Boiler Maker, vol. 27, no. 1, Jan. 1927, pp. 19–20. General significance of chemical analysis; flux coatings; cast-iron and alloy filler rods.

Fusion. Fusion Welding and Permanent Fracture (Schmelzfchweissung und Dauerbruch), P. H. Schottky. Kruppsche Monatshefte, vol. 7, Dec. 1926, pp. 213–216, 11 figs. Reviews number of cases of broken structural and machine parts showing that fractures could be directly traced to welding applications, and explains why this method of repair is detrimental.

Oxyacetylene. See OXYACETYLENE WELDING.

Power Plants. Special Uses of Welding in Westport Station. Power, vol. 65, no. 7, Feb. 15, 1927, pp. 249–250, 5 figs. Welding used for variety of purposes, including pipe-line fabrication, replacement of studs in boiler handhole plates, repair of broken stoker cranks and removal of generator rotor end rings.

Progress in. Recent Progress in the Welding Field, R. E. Smythies. Can. Machy., vol. 37, no. 3, Jan. 20, 1927, pp. 22–26, 5 figs. Outlines progress made in both structural steel and machinery fields. Paper read before Eng. Inst. of Canada.

THE ENGINEERING INDEX

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Mechanical Engineering Section

THE ENGINEERING INDEX presents each month, in conveniently classified form, items descriptive of the articles appearing in the current issues of the world's engineering and scientific press of particular interest to mechanical engineers. At the end of the year the monthly instalments are combined along with items dealing with civil, electrical, mining and other branches of engineering, and published in book form, this annual volume having regularly appeared since 1906. In the preparation of the Index by the engineering staff of The American Society of Mechanical Engineers some 1200 technical publications received by the Engineering Societies Library (New York) are regularly reviewed, thus bringing the great resources of that library to the entire engineering profession.

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AERONAUTICAL INSTRUMENTS

Acceleration Recorder. DVL Recording Apparatus for Vertical Accelerations (Aufbau und Eigenschaften des DVL-Beschleunigungsschreibers YV), H. Wendroth and G. Wollé. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 17, no. 24, Dec. 28, 1926, pp. 532–534, 3 figs. Details of instrument and results of experiments made with it.

Anti-Stall Gear. The Savage-Bramson Anti-Stall Gear. Instn. Aeronautical Engrs.—Jl., vol. 1, no. 2, Feb. 1927, pp. 59–61. Apparatus consists chiefly of stall detector and actual warning or operating unit; apart from these two, there is small air pump and air reservoir.

AIR COMPRESSORS

Diesel Engines. Modern Air Compressor Practice in Oil Engine Installations, R. L. Quertier. Diesel Engine Users Assn.—Report of Discussion, no. S 75. Deals with air compressor as driven by main Diesel engine to supply necessary air for atomizing fuel and charging starting bottles and with auxiliary compressors for charging purposes, etc.

Turbo. Acceptance Tests of Turbo-Compressors (Abnahmeversuche an Turbokompressoren), H. Rollwagen. V.D.I. Zeit., vol. 71, no. 6, Feb. 5, 1927, pp. 196–198. Results of tests carried out on compressors of Mörser Bituminous Coal Mining District; maximum efficiency, pumping performance; condensation requirement; difference between measurement in suction and pressures; maximum and pumping efficiency of different compressors.

AIRCRAFT

Landing and Stopping Mechanisms. Aircraft Alighting and Arresting Mechanisms. Instn. Aeronautical Engrs.—Jl., vol. 1, no. 2, Feb. 1927, pp. 29–47 and (discussion) 47–55, 15 figs. Design of aircraft arresters; particulars of compression rubbers.

AIRCRAFT CONSTRUCTION MATERIALS

Dopes. Cellulose Acetates for Aero Dopes, H. T. S. Britton. Indus. Chemist, vol. 3, no. 25, Feb. 1927, pp. 59–61, 1 fig. Deals chiefly with acetylene cellulose coverings, with brief reference to those of nitro-cellulose.

AIRPLANE ENGINES

Installation. Aircraft Power Plant Installations, H. M. Mullinnix. Am. Soc. Naval Engrs.—Jl., vol. 39, no. 1, Feb. 1927, pp. 68–75. Deals with installation or suspension of engine in structure of airplane.

Paris Show. Engines at 10th Aeronautical Show in Paris (Les moteurs au Xe Salon de l'Aviation). Aéronautique, vol. 9, no. 92, Jan. 1927, pp. 11–20, 26 figs. Air-cooled engines with outputs up to 600 hp. were shown, proving that engines of that size can be built without introducing too many complications and increasing weight inordinately; water-cooled engines seem to be lighter in weight than air-cooled; presents table showing characteristics of various engines; among interesting exhibits are Caffort, built for purpose of being located within fixed wing of large plane, and consisting of 12 horizontal cylinders opposed to each other in sets of six; weight per horsepower of Renault engine was reduced without changing relative dimensions of engine, and its general design; in double-action Pouit and Georges, symmetrical crankshaft comprises five throws with axes located in same plane. See also translated abstract in Mech. Eng., vol. 49, no. 4, Apr. 1927, pp. 361–362, 1 fig.

Tests. Description of the N. A. C. A. Universal Test Engine and Some Test Results, M. Ware. Nat. Advisory Committee for Aeronautics—Report, no. 250, 1927, 15 pp., 11 figs. Describes 5-in. bore by 7-in. stroke single-cylinder test engine used at Langley Field laboratory, and results of tests made therewith; data have been obtained which indicate effect of changes of compression ratio on friction horsepower and volumetric efficiency.

AIRPLANE PROPELLERS

Economical Design. An Approximate Solution of Problem of Economic Airplane Propeller (Eine Näherungslösung des Problems der wirtschaftlichen Luftschraube), H. B. Helmbold. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 18, no. 1, Jan. 14, 1927, pp. 13–15, 1 fig. Condition for minimum loss; calculation of efficiency; application of results.

AIRPLANES

Ailerons. Researches on Ailerons and Especially on the Test Loads to Which They Should Be Subjected, J. Sabatier. Nat. Advisory Committee for Aeronautics—Tech. Memorandums, no. 398, Feb. 1927, 25 pp., 5 figs. Shows that problem is quite complex and it should receive more attention; in France ailerons are included in static tests of wing and as if they formed integral portion of them; German, Italian and American specifications, most of which do not directly involve aerodynamic characteristics of airplane, notably its speed; investigates stresses to which ailerons are exposed in flight; presence of appreciable clearance or slot between aileron and wing increases stresses. Translated from Technique Aéronautique, Nov. 15 and Dec. 15, 1926.

Airfoils. Pressure Distribution Over Airfoils at High Speeds, L. J. Briggs and H. L. Dryden. Nat. Advisory Committee for Aeronautics—Report no. 255, 1927, 42 pp., 17 figs. Extension of investigation of aerodynamic characteristics of certain airfoils; results presented in Report No. 207 have been confirmed and extended to higher speeds through more extensive and systematic series of tests; tests were made on models of 1-in. chord.

Controls. Aeroplane Controls: Faults and Diagnosis, W. G. Gibson. Roy. Aeronautical Soc.—Jl., vol. 31, no. 195, Mar. 1927, pp. 237–243. Deals with functioning, maintenance and adjustment of flying controls.

Curtiss. Curtiss Builds New Navy Fighter. Aviation, vol. 22, no. 11, Mar. 14, 1927, pp. 514–515, 3 figs. F7c–1 single-seater shipboard fighter with air-cooled engine.

Flap Gear. Flap Gear for Aeroplanes, A. H. Tiltman. Automobile Engr., vol. 17, no. 225, Feb. 1927, pp. 60–64, 13 figs. Geoffrey de Havilland has conceived idea of producing gear which would function automatically, be foolproof in operation, and require no attention on part of pilot.

Flying Boats. See FLYING BOATS.

Heinkel. A German Air Survey Machine. Aeroplane, vol. 32, no. 3, Jan. 19, 1927, 74, 2 figs. Heinkel H.D.20 is rigidly braced twin-engined biplane, fitted with two Wright Whirlwind radial air-cooled engines each of 200 hp.; designed specially for air survey and for experimental wireless work.

Huff Daland. The Huff Daland Cyclops. Aviation, vol. 22, no. 7, Feb. 14, 1927, p. 333, 1 fig. New bomber is world's largest single-engine plane; designed to be powered with new 24-cylinder, 1200-hp. air-cooled engine being constructed by Air Corps Engineering Division at McCook Field.

Koolhoven. A New Koolhoven Light 'Plane. Flight, vol. 19, no. 5, Feb. 3, 1927, p. 56, 4 figs. Two-seater touring and sporting machine is parasol cantilever monoplane fitted with "pusher" engine.

Light. The Sellers Lightplane, M. B. Sellers. Aviation, vol. 22, no. 9, Feb. 28, 1927, pp. 416–417, 5 figs. Early glider experiments have led to adoption of new principles to simplify control and add to safety.

Mechanical Resistance. Permanent Commission of Aeronautical Studies Report No. 4. Nat. Advisory Committee for Aeronautics—Tech. Memorandums, no. 402, Mar. 1927, 19 pp. Conclusions approved by subcommittees on determination of mechanical resistance to airplanes; includes (1) determination of main conditions entailing overload and examination of existing theoretical and experimental data; (2) reduction of general conditions of calculation to some simple cases; (3) determination of load factors to be adopted in each of these cases; (4) methods of control, known as static tests. Supp. to Bul. de la Chambre Syndicale des Industries Aéronautiques.

Metal. Economical Production of All-Metal Airplanes and Seaplanes, A. Rohrbach. Soc. Automotive Engrs.—Jl., vol. 20, no. 1 and 3, Jan. and Mar. 1927, pp. 57–66 and 366–368, 21 figs. Reduction of cost and of time required to construct airplanes and seaplanes by applying so-called shipbuilding practice to their fabrication; outlines technical principles, including reasons for their adoption and then describes organization of work of construction; wing loading and power loading; author's company builds monoplanes only; advantages and disadvantages of side-by-side propellers and of central-tandem propellers.

Model Tests. Model Tests with New Types of Airplanes (Modellversuche mit neuartigen Flugzeugtypen), A. Lippisch. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 17, no. 24, Dec. 28, 1926, pp. 549–554, 21 figs. With aid of known conditions, required size of free-flying glider model is established by formulas; conditions for stability of airplanes without control is investigated by approximate method and derived relations are used to find torsional stresses in different wing types.

Personal Use. Airplanes for Individual Ownership, L. G. Meister. Soc. Automotive Engrs.—Jl., vol. 20, no. 3, Mar. 1927, pp. 341–344 and (discussion) 344–345 4 figs. Author advises adoption of definite factors of safety for structural parts of commercial airplanes, similar to those demanded in military aviation but modified because commercial-airplane service is less severe; safety in flying is paramount.

Rohrbach. Rohrbach Metal Aircraft Construction. Aviation, vol. 22, no. 11, Mar. 14, 1927, pp. 519–522, 12 figs. Low constructional costs and easy adaptation to quantity production are basic features of German constructor's methods.

Seaplanes. See SEAPLANES.

Spartan. The Spartan C-3 Commercial Plane. Aviation, vol. 22, no. 9, Feb. 28, 1927, pp. 421–422, 3 figs. Modern three-place biplane designed to Dept. of Commerce Class I load factors.

Struts. Calculation of Airplane Wings with Struts in V- and N-Form (Zur Berechnung von Flugzeug-Tragwerken mit Verbundstielen in V- und N-Form),

Note.—The abbreviations used in indexing are as follows:

Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

K. Thalau. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 17, no. 21, Nov. 13, 1926, pp. 455–466, 10 figs. Results of investigation and numerical examples.

Two-Engined. Aerodynamic Investigations of a Two-Engined Commercial Biplane (Aerodynamische Untersuchungen an cinem zweimotorigen Verkehrsdoppeldecker), H. Wiederhold. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 18, no. 1, Jan. 14, 1927, pp. 7–11, 9 figs. Results of investigations contributing to study of conditions in two-engined decentralized airplanes; deals specifically with horizontal limit speeds with one and two engines; compensation of shear moment with failure of one engine; and influence of propeller jet on longitudinal stability.

Wing Flutter. Concerning Wing-Flutter. Aeroplane, vol. 32, no. 8, Feb. 23, 1927, pp. 208 and 210, 1 fig. Cause of flutter and how it is provoked; conditions which determine whether flutter shall occur; remedies.

Wings. On the Mutual Reaction of Wings and Body (Beitrag zur theoretischen Behandlung des gegenseitigen Einflusses von Tragfläche und Rumpf), J. Lennertz. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 18, no. 1, Jan. 14, 1927, pp. 11–13, 6 figs. Also translation in National Advisory Committee for Aeronautics—Tech. Memorandums, no. 400, Feb. 1927, 6 pp., 8 figs. Results of theoretical investigations; in author's calculations, he has considered monoplane in which axis of wing is rectilinear; in case of wings of finite span, total lift and its distribution over span are obtained from consideration of flow at infinite distance from wing and with help of theory of momentum; if distribution of circulation is constant over span, then, according to Prandtl wing theory, wing and free vortices can be replaced by roughly horseshoe-shaped vortex; considers problem of minimum induced drag for given lift for case when wing axis and body axis intersect.

Precision of Wing Sections and Consequent Aerodynamic Effects, F. Rizzo. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 255, Jan. 1927, 15 pp. 5 figs. Investigation to determine precision of wing sections of wood fabric construction used on number of airplanes; it was found that all wing sections deviated more or less from their respective prototypes; mean thickness of section was computed for those wings with noticeable sag; aerodynamic effects resulting from consideration of thickness variation are then estimated from existing empirical information.

AIRSHIPS

Fuels for. Use of Gaseous Fuel in Airships (Ueber die Verwendung gasförmiger Betriebsmittel im Luftschiff), Lempertz. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 17, no. 24, Dec. 28, 1926, pp. 529–530. Discussion of six different possible combinations of fuel and inflation gas; these are hydrogen as carrier and gasoline for fuel; hydrogen as carrier and as fuel with additional gasoline; gaseous hydrocarbon of specific gravity of air as fuel; hydrogen as carrier and fuel with additional liquid hydrogen as fuel; of all of these possibilities use of hydrocarbons of same specific gravity as air is best; statements based on actual experiments by Zeppelin Co.

Hangars and Mooring Masts. The Cardington Airship Shed and Mooring Tower. Engineer, vol. 143, no. 3712, Mar. 4, 1927, pp. 230–231, 5 figs., partly on p. 242. Reconstruction of hangar; enlarged shed was designed to withstand horizontal wind load of 35 lb. per sq. ft. on roof and of 30 lb. on sides, ends and doors. It has a floor area of 4³/₄ acres, and capacity of 26.6 million cu. ft.

Metal-Clad. Metal-Clad Rigid Airship Development. Instn. Aeronautical Engrs.—Jl., vol. 1, no. 1, Jan. 1927, pp. 6–20. Discusses advantages and disadvantages of helium and hydrogen; low-fineness hull; results of aerodynamic tests established without any question of doubt that short, compact shape could be satisfactorily used; structural design; result of water-model tests; present type of rigid.

Non-Rigid. Kort Airship (Das Kortsche Luftschiff), R. Kehler. Zeit. für Flugtechnik und Motorluftschiffahrt, vol. 17, no. 24, Dec. 28, 1926, pp. 527–529. Author refers to article by L. Kort in Aug. 28 issue of same journal describing non-rigid airship consisting of framework of tubular trunks inflated to high pressure and sustaining lighter envelope; attitude was taken that this design made possible larger ships than ordinary non-rigid design and that large saving in weight compared with rigid ships was possible; present author takes issue with these conclusions; on basis of calculations given, he claims that pressure used by Kort in tubular trunks was not sufficient, and that when enough pressure was provided no weight saving as compared with ordinary non-rigid design would result; he recommends use of steel-reinforced envelopes.

Terminals. Airship Terminals. Aviation, vol. 22, no. 11, Mar. 14, 1927, pp. 527–528, 1 fig. Mast is highly satisfactory method of mooring commercial airships; prevention of pitching one of the problems to be solved; taking-on and releasing airplanes from airships in flight.

United States. The Present Airship Situation in the U. S. Aviation, vol. 22, no. 7, Feb. 14, 1927, p. 323. Author puts in strong plea for continuation of experimental work in development of rigid airships for both national defense and commercial operation; emphasizes importance of helium in airship operation, expressing belief that there is little or no future for use of highly inflammable hydrogen gas; light alloys.

ALCOHOL

Ethyl. Ethyl Alcohol from Cellulose (L'Alcool éthylique de cellulose), G. Meunier. Chimie & Industrie, vol. 16, no. 3, Sept. 1926, pp. 369–371. Describes plant treating 10 tons in 24 hours of cellulose material; economic considerations.

[See also METHANOL.]

ALLOY STEELS

Electrotechnical. Special Steels (Les aciers spéciaux), M. R. Jouaust. Société Française des Électriciens—Bul., vol. 6, no. 62, Oct. 1926, pp. 1175–1182. Discusses magnetic substances of high initial permeability and small total losses, particularly with reference to their use in long-distance telephone lines; magnetic data are given for iron-dust cores made by Western Electric Co., and mode of preparation of these cores, which may advantageously be used for Pupin coils; composition of permalloy; with its high permeability in weak fields, small hysteresis losses and high resistivity, it is particularly suitable for use in Krarup process, thin ribbon of this material being wound round cable; permax, a nickel-steel alloy; discusses cobalt steels of high coercive force, such as KS alloy of Honda, for making permanent magnets.

Locomotives. Making Locomotives Stronger, W. A. Newman and C. F. Pascoe. Iron Age, vol. 119, no. 10, Mar. 10, 1927, pp. 701–704, 10 figs. Canadian Railroad secures better quality and service from vanadium and nickel cast-steel frames; manufacture, structure and heat treatment.

ALLOYS

Aluminum. See ALUMINUM ALLOYS.

Bearing Metals. See BEARING METALS.

Brass. See BRASS.

Bronzes. See BRONZES.

Copper. See COPPER ALLOYS.

Iron. See IRON ALLOYS.

Magnesium. See MAGNESIUM ALLOYS.

ALUMINUM

Gasket Material. Aluminum as a Gasket Material, J. E. Housley. Power, vol. 65, no. 10, Mar. 8, 1927, p. 374. Aluminum gaskets have been used for many purposes about oil refineries for number of years owing to resistance to corrosion and oxidation by oil compounds at high temperatures and pressures.

Soldering and Welding. Some Practical Notes on Soldering and Welding Aluminum, A. Eyles. Engineer, vol. 143, no. 3708, Feb. 4, 1927, pp. 121–123, 5 figs. It is shown that aluminum can be welded but it is not advisable to employ soldering methods, strictly speaking, for assembly of structures; its only actual feasible applications are for repairing fractured or broken parts, and for filling up surface holes and slight defects in castings; it can also be applied on stressed members or on any components, failure of which might be serious; two distinct methods used in welding aluminum are puddling and flux systems; preparation of metal for welding and execution of welds in aluminum.

ALUMINUM ALLOYS

Airplane Material. Light Metal for Airplane Construction (Lättmetall för flygplanskonstruktioner), T. Angström. Ingeniörs Vetenskaps Akademien—Handlingar, no. 51, 1926, pp. 5–30, 13 figs. Deals with ultra-light alloys, light aluminum alloys capable of being rolled, including aludur, lautal, skleron and duralumin; heat treating and working of duralumin; corrosion. Bibliography.

Deformation. Deformation of an Aluminum Alloy by a Constant Load, C. B. Sadtler and J. L. Gregg. Am. Inst. Min. & Met. Engrs.—Trans., no. 1645-E, Mar. 1927, 6 pp., 4 figs. Deals with variations of deformation produced by constant tensile stress acting for varied lengths of time in special case of thin aluminum alloy sheet of duralumin type, which has been subjected to different thermal and mechanical treatments; it was found that at sufficiently high constant tension such material deforms continuously with elapse of time and that rate at which this deformation occurs is greatly influenced by previous thermal and mechanical treatment.

Duralumin. See DURALUMIN.

Lautal. The Wrought Light Alloy "Lautal." Engineering, vol. 123, no. 3186, Feb. 4, 1927, p. 133. This alloy, which has recently come into prominence possesses property of age hardening, but does not age automatically at room temperatures; special tempering treatment is necessary in order to produce maximum tensile strength and Brinell hardness obtainable; this is main advantage claimed by originators of alloys; aging is carried out on finished articles, after forging and working operations are completed, process consisting of heating them in oil bath for 16 hours at temperature of 120 to 130 deg. cent.; it contains 4 per cent copper, 2 per cent silicon, and remainder is made up of aluminum of commercial purity.

Transportation Equipment. Light Metal in Transportation Equipment (Das Leichtmetall im Verkehrswesen), H. Kuhnen. Zeit. für Metallkunde, vol. 19, no. 1, Jan. 1927, pp. 22–24, 7 figs. Discusses increasing use of high-grade aluminum alloys in automobile construction, cycles and motorcycles, rolling stock, aircraft and shipbuilding; advantages include increase of starting acceleration, better braking efficiency, increased average speed, greater safety, less power requirement, and greater economy.

AMMONIA COMPRESSORS

Power Consumption. Power Consumption of Ammonia Compressors, W. H. Motz. Power, vol. 65, no. 11, Mar. 15, 1927, pp. 409–410, 2 figs. Theoretical power requirements; actual indicated horsepower; input horsepower; horsepower charts.

Sleeve-Valve. The High-Speed Compressor, E. Prestage. Ice & Cold Storage, vol. 30, no. 348, Mar. 1927, pp. 65–70 and (discussion) 75–76, 7 figs. Consideration of sleeve valve as presenting ideal solution of high-speed problem.

The Sleeve Valve in Refrigerating Practice, E. Prestage. Cold Storage, vol. 30, no. 347, Feb. 17, 1927, pp. 52–55, 11 figs. High-speed-compressor problems and their solution.

AUTOMOBILE ENGINES

Combustion. Studies of Combustion in the Gasoline Engine, W. G. Lovell and J. D. Coleman, with T. A. Boyd. Indus. & Eng. Chem., vol. 19, no. 3, Mar. 1927, pp. 373–378, 10 figs. Determination of rate of burning by chemical analysis; burning of hydrogen and carbon monoxide.

8-Cylinder. The Pronounced Trend Towards the Eight Cylinder Car, D. Fergusson. Rochester Engr., vol. 5, no. 9, Mar. 1927, pp. 184–188, 2 figs. Points out that there is marked tendency towards 8-cylinder engine either constructed with all cylinders in line or of "V" type with two blocks of four cylinders set at angle of 60 or 90 deg. to one another; advantages of 8-cylinder as compared with similar design of 6-cylinder; new "V" type has all advantages of 8-cylinder-in-line type without any of its disadvantages; these advantages are so vital that future of this type of 8-cylinder engine is assured, especially in larger sized engines.

Fuels. See AUTOMOTIVE FUELS.

Heavy-Oil. Adaptation of Gasoline Engines to Use of Heavy Oils (L'adaptation des moteurs à essence aux huiles lourdes), P. Dufour. Chimie & Industrie, vol. 16, no. 3, Sept. 1926, pp. 380–382. Mixture of oil and gasoline; direct carburetion of oil; process of preliminary evaporation; super-Diesel engines; in author's opinion, it is possible to develop light engine of high speed, to operate with heavy oils.

High-Speed Oil Engines for Vehicles, L. Hausfelder. Nat. Advisory Committee for Aeronautics—Tech. Memorandums, no. 397, Feb. 1927, 32 pp., 10 figs. Deals with engines with external and internal atomization of fuel, hot-bulb and Diesel engines. Translated from Motorwagen, Aug. 31, 1926.

Quantity Production. Making Yellow Sleeve-Valve Engines, C. O. Herb. Machy. (N. Y.), vol. 33, no. 7, Mar. 1927, pp. 492–495, 6 figs. Selected operations performed on Knight sleeve-valve coach, cab and truck engines built by Yellow Sleeve-Valve Engine Works, Inc., East Moline, Ill.

AUTOMOBILES

Brake Linings. Some Factors That Affect the Frictional Properties of Automobile Brake-Linings, H. H. Allen. Soc. Automotive Engrs.—Jl., vol. 20, no. 1, Jan. 1927, pp. 77–85, 13 figs. Laboratory tests have been paralleled by series of experiments undertaken with view to securing data on working conditions of brakes of automobile in actual service, particular attention being given to nature and magnitude of causes that lead to variations of braking ability; three series of tests were made; (1) with brake linings dry, (2) after linings had been soaked with water and (3) after linings had been dried and treated with liberal potions of oil; conclusions.

Brakes. Brakes for Automotive Use, J. Wiggers. Soc. Automotive Engrs.—Jl., vol. 20, no. 1, Jan. 1927, pp. 141–145 and (discussion) 145–147, 12 figs. Review of developments that led to present status of braking systems for automotive use, including suggestions for minimizing or eliminating defects in each system; drawings to illustrate points covered are presented; hydraulic, air-pressure and vacuum types of brake.

Chain Drive. See CHAIN DRIVE.

Design. Trends in Passenger-Car Design. Soc. Automotive Engrs.—Jl., vol. 20, no. 2, Feb. 1927, pp. 195–196 and 254. Tendencies evidenced at recent national automobile shows analyzed.

Frames, Weaving Stresses in. Stresses in Weave-Resisting Frames, B. Liebowitz. Soc. Automotive Engrs.—Jl., vol. 20 no. 4, Apr. 1927, pp. 460–462, 3 figs. Mathematical analysis of weaving stresses in automobile frame; these forces consist principally of twisting couple, axis of which is longitudinal axis of frame; weave resistance of frames can be greatly increased by use of torsionally stiff cross-members, or by other means; present analysis is confined to case in which weave resistance is obtained by use of such cross-members alone, neglecting any assistance that frame members may receive from body or other parts.

Headlights. Headlighting Symposium at 1926 Semi-Annual Meeting. Soc. Automotive Engrs.—Jl., vol. 20, no. 1, Jan. 1927, pp. 148–155. Contains following contributions: Headlighting Requirements and Available Testing-Apparatus, R. N. Falge; Method of Obtaining Various Types of Beam Pattern, J. H. Hunt; Causes of Defective Head-Lamps, A. W. Devine; Studying the First Principles of Headlighting, H. M. Crane; Best Use of Light Depends on Personal Judgment, C. H. Sharp.

Hillman. New Models of the Hillman "Fourteen." Auto-Motor Jl., vol. 32, no. 9, Mar. 3, 1927, pp. 183–186, 10 figs. Engine clutch and gear are in unit and whole power plant is three-point suspended in deep pressed-steel chassis frame by means of two brackets taken from flywheel housing and forward trunnion bearing which is rubber bushed; carburetor is Zenith horizontal; cooling is by thermo flow; lubrication is automatic.

Light, English. The English Light-Car and Why, A. R. Fenn. Soc. Automotive Engrs.—Jl., vol. 20, no. 2, Feb. 1927, pp. 203–213, 8 figs. Review of developments; specifications of Morris-Cowley typical light car; presents table of performance of 10 English and Continental light cars and also table of running costs aggregating $750 a year; two interesting new developments are Trojan general-utility car having two-cylinder two-stroke 10-hp. engine, and Constantinesco, which has engine of similar type; six-cylinder engine development is evident.

Paris Show. Paris Automobile Show 1926 (Der Pariser Automobilsalon 1926), A. Zoller. V.D.I.

Zeit., vol. 71, no. 4, Jan. 22, 1927, pp. 115-117, 10 figs. Tendency towards 6-cylinder engine; 4-wheel brakes; front-wheel drive of Bucciali and Arzac; 2-cycle engines and motor trucks with suction-gas drive; other features.

Pivoting. Why Does a Car "Pivot?" J. Plum. Soc. Automotive Engrs.—Jl., vol. 20, no. 2, Feb. 1927, pp. 221-226, 4 figs. Analyzes pivoting and explains its causes under (1) "dry-roadway" and (2) "skiddy-roadway" conditions; concludes that for two conditions it is necessary to design four-wheel-brake system that combines two different methods of appropriate distribution of braking force because requirements are so different.

Sunbeam. The Sunbeam Sixteen Six. Auto-Motor Jl., vol. 32, no. 8, Feb. 24, 1927, pp. 163-166, 11 figs. Engine has its cylinders monobloc; overhead valves are carried in detachable cylinder head; Claudel-Hobson carburetor of vertical type with inlet pipe to engine heated by hot-water jacket supplies gas.

Transmission. A Four-Speed Internal-Underdrive Transmission, C. A. Neracher and H. Nutt. Soc. Automotive Engrs.—Jl., vol. 20, no. 2, Feb. 1927, pp. 247-254, 12 figs. Reasons for failure of present four-speed transmissions to give satisfaction are cited, and stress is laid on need of reducing maximum engine speed while at same time maintaining or improving overall car ability; describes four-speed transmission by which gasoline consumption, as indicated by road tests, is said to show saving of approximately 20 per cent.

AUTOMOTIVE FUELS

Anti-Knock. Combustible Liquids of High Organic Sulphur Content as a Source of Anti-Detonators (Utilisation des combustible liquides à teneur élevée en composés sulfo-organiques, comme source de combustible antidétonant), Y. Altchidjian. Académie des Sciences—Comptes Rendus, vol. 183, no. 21, Nov. 22, 1926, pp. 975-978. Distillation of bituminous limestones of Raguse yields heavy fractions up to 350 deg., which may be used satisfactorily in internal-combustion engines without producing detonation; this is due partly to presence of high proportion; of hydrocarbons which have undergone certain amount of degradation toward unsaturated, cyclic state, and partly to presence of organic sulphur compounds. See brief translated abstract in Chem. & Industry, vol. 46, no. 3, Jan. 21, 1927, p. 34.

The Vapor-Phase of the Anti-knock Problem. W. G. Leamon. Soc. Automotive Engrs.—Jl., vol. 20, no. 1, Jan. 1927, pp. 67-76, 13 figs. In opinion of author, cracking processes of future will be of vapor-phase type, which gives product far superior in its anti-knock properties; composition and distinguishing characteristics of various families of petroleum oils are explained, including such groups as paraffins, olefins, naphthenes and aromatics, last named including naphthalenes; describes particular vapor-phase product, Stellarene, consisting almost entirely of two series, olefin and naphthene, and produced by breaking up of large molecules in vapor phase in presence of catalyst.

Theory That Non-Conductivity Causes Knock Not Borne Out by Known Facts, G. G. Brown. Nat. Petroleum News, vol. 19, no. 6, Feb. 9, 1927, pp. 88-94. Reply to article by H. Grote published in Dec. 29, 1926, issue of same journal, under title "Gasin, a new working substance for internal-combustion motors," pointing out disadvantages in use of tetraethyl lead in being poisonous, and of iron carbonyl in depositing iron oxide causing valve and lubrication troubles; author criticizes hypothesis put forth by Dr. Grote and gives constructive suggestion in form of another hypothesis.

Coal, Gasoline Substitutes from. Production of Gasoline Substitutes from Coal, A. C. Fieldner. Soc. Automotive Engrs.—Jl., vol. 20, no. 1, Jan. 1927, pp. 98-103, 5 figs. and (discussion) 103-104. Presents general review of situation and status of research in manufacture of gasoline substitutes from coal of which enormous quantities remain unmined in United States.

Detonation. Detonation Characteristics of Petroleum Motor-Fuels, S. P. Marley, D. R. Stevens and W. A. Gruse. Soc. Automotive Engrs.—Jl., vol. 20, no. 2, Feb. 1927, pp. 214-220, 3 figs. Examination for detonating qualities of 18 petroleum gasolines were made, methods used being those of direct engine tests and of chemical analysis; work confirms general belief that detonating tendency increases with rise in boiling point; indications are that petroleum gasolines of satisfactory anti-knock value are available and that detonating tendency of gasolines is best determined by direct engine test.

Detonation Specifications for Automotive Fuels, G. Edgar. Soc. Automotive Engrs.—Jl., vol. 20, no. 2, Feb. 1927, pp. 245-246. Two hydrocarbons are cited that seem to be ideally suited for standard reference fuels, namely, pure normal heptane C_7H_{16} and pure octane C_8H_{18}, which is prepared synthetically from tertiary butyl alcohol; by mixing these two hydrocarbons in different proportions, it is said to be possible to duplicate knocking characteristics of any commercial fuel between limits of 60 per cent of heptane and 40 per cent of octane and 40 per cent of heptane and 60 per cent of octane.

Dopes and Detonation. Dopes and Detonation, H. L. Callendar. Engineering, vol. 123, nos. 3186, 3187 and 3188, Feb. 4, 11 and 18, 1927, pp. 147-148, 182-184, and 210-212, 7 figs. Results of experiments made in Air Ministry Laboratory at Imperial College of Science, London. Effect of peroxides in nuclear drops; effect of mixture strength on temperature of initial combustion; engine speed and activation of mixture; aldehydes and detonation; conclusion is that detonation in paraffin fuels and ether is due to accumulation of peroxides in nuclear drops during rapid compression; metallic dopes act by reducing peroxides as fast as they are formed and preventing their accumulation, delaying ignition of drops.

Improvement. Problems of Automobile Engines and Substitute Fuels (Le stade actuel des problèmes du moteur d'automobile et des carburants de remplacement), A. Grebel. Génie Civil, vol. 89, nos. 23, 24 and 25, Dec. 4, 11 and 18, 1926, pp. 499-502, 532-534 and 552-556. Points out that thermodynamic quality of motor fuels can and should be improved; manufacture of fuels by direct hydrogenation of coal, according to Bergius process; manufacture of volatile fuels by cracking; catalysts and hydrogenation of natural or prepared liquid fuels, and direct utilization of these fuels in engines.

Makhonine Carburant. The Makhonine Carburant. Petroleum Times, vol. 17, no. 424, Feb. 26, 1927, pp. 385-386. Includes translation of inventor's communication in which he states that carburant is at present obtained from coal tars, heavy oils de-benzoled, so that it is possible to transform about 90 per cent; essential merit of product obtained is that it is non-inflammable at ordinary temperatures and pressures, stable and non-volatile; use of this carburant in exploitation will not be possible until maker can give guarantee for constituency of composition quite as reliable as those exacted at present for various qualities of motor gasoline used for airplanes.

Starting Properties. A Laboratory Method of Determining the Starting Properties of Motor Fuels, W. G. Lovell and J. F. Coleman with T. A. Boyd. Indus. & Eng. Chem., vol. 19, no. 3, Mar. 1927, pp. 389-394, 10 figs. Method consists in measuring directly air-fuel ratio necessary to produce explosive mixture at any given temperature; it has been applied to testing of considerable number of fuels of widely different properties, over broad temperature range, and has been found to yield results that are comparable with those obtained in starting tests on actual engines.

Fuel Requirements for Engine-Starting, C. S. Cragoe and J. O. Eisinger. Soc. Automotive Engrs.—Jl., vol. 20, no. 3, Mar. 1927, pp. 353-363 and (discussion) 364-365, 12 figs. Fuel requirements for engine starting are defined as follows: (1) possible starting with a 1 to 1 mixture supplied at lowest temperature ever anticipated and (2) starting in 10 engine revolutions with a 2 to 1 air-fuel mixture supplied at average minimum temperature encountered in service; these definitions serve to fix percentage of fuel that must be evaporated at each of temperatures in equilibrium air distillations, namely, 5 per cent in a 1 to 1 mixture and 15 per cent in a 2 to 1 air-fuel mixture supplied.

Testing. Apparatus and Method for Rating Motor Fuels in the Order of Detonation, W. F. Faragher and W. H. Hubner. Soc. Automotive Engrs.—Jl., vol. 20, no. 3, Mar. 1927, pp. 405-408, 3 figs. Describes apparatus and method of operating it in determining rating of motor fuels in order of their detonation; results obtained in experiments are presented graphically.

[See also AIRSHIPS, Fuels for; ALCOHOL.]

AVIATION

Landing Fields, Lighting. See LIGHTING, Landing Fields.

B

BALANCING MACHINES

Static. Static Balancing Machine. Iron Age, vol. 119, no. 11, Mar. 17, 1927, p. 789, 3 figs. Simple operation features unit for production balancing of narrow-faced parts, placed on market by Gisholt Machine Co., Madison, Wis.

BEARING METALS

Calculating Metal Quantities. Calculating Metal Quantities for Alloys, A. W. Beshgetoor. Am. Mach., vol. 66, no. 8, Feb. 24, 1927, p. 331, 1 fig. Method suitable for calculating bearing-metal alloys to any desired composition.

BEARINGS, ROLLER

Railway. Anti-Friction Bearings for Heavy Duty on Railway Rolling Stock. Ry. & Locomotive Eng., vol. 40, no. 2, Feb. 1927, pp. 38-41, 4 figs. Application of roller bearings to Bethlehem auxiliary locomotive.

BLAST FURNACES

Producer Gas. Partial or Total Replacement of Metallurgical Coke by Producer Gas in Blast Furnaces (Du remplacement partiel ou total dans les hauts fourneaux du coke métallurgique par du gaz de gazogène), R. D. Lance. Chimie & Industrie, vol. 16, no. 3, Sept. 1926, pp. 399-405. Shows that use of producer gas permits elimination in charge of at least 70 per cent of coke, which can be replaced by cheaper fuels; proposed system requires 2 rows of tuyeres, about 1 m. apart, 2 sets of recuperators, and one or more producers burning coal or lignite.

Reduction by Gas. New Blast-Furnace Process (Ein neuer Hochofenprozess), P. W. Uhlmann. Chemiker-Zeitung, vol. 51, no. 4, Jan. 15, 1927, pp. 37-38. From theoretical considerations (thermal relations), new process of using gas for blast-furnace reduction has some advantages over coke reduction and should be commercially successful; most satisfactory gas is water gas enriched with hydrogen to contain about 35 per cent CO and 65 per cent H_2.

Specific Efficiency. Specific Efficiency of the Blast Furnace, R. Franchot. Am. Inst. Min. & Met. Engrs.—Trans., no. 1596-C, Sept. 1926, 18 pp., 1 fig. Presents analysis showing that typical furnace is not less efficient as gas producer than as iron smelter; improvement of efficiency in iron making is to be sought through utilizing some of latent energy of CO_2 which now passes undeveloped and unused out of furnace top; it narrows problem down to one of increasing CO_2 ratio, thus developing greater proportion of energy in form of coke and air put into furnace; efficiency of Lowthian Bell's furnace; relation of energy input to work done; surplus energy in coke furnaces.

BOILER FEEDWATER

Foaming and Priming. Present Knowledge of Foaming and Priming of Boiler Water, with Suggestions for Research, C. W. Foulk. Am. Water Works Assn.—Jl., vol. 17, no. 2, Feb. 1927, pp. 160-173. Progress report of Subcommittee No. 3 on zeolite softeners, internal treatment, priming and foaming, and electrolytic scale prevention.

Treatment. Boiler Scale and Its Prevention (Sur un cas d'incrustation des chaudières alimentées avec de l'eau épurée et le moyen de l'éviter), P. LeTellier and H. Sunder. Chimie & Industrie, vol. 16, no. 3, Sept. 1926, pp. 241-242. Describes process of treating feedwater by replacing adequate quantity of sodium phosphate by phosphoric acid.

Experience and Progress in Treatment of Boiler Feedwater (Neuere Erfahrungen und Fortschritte in der Behandlung des Kesselspeisewassers), E. Gutmann. Dinglers polytechnisches Jl., vol. 108, no. 3, Feb. 1927, pp. 29-31. Points out that one of newest and most noteworthy means of preventing boiler scale is known under trade name of Kespurit, which has been in successful use for several years; it is water-soluble colloid enveloping smallest scale-forming constituents, which are thus prevented from wandering as insoluble colloids in boiler.

Pretreatment of Boiler Feedwater, C. R. Knowles. Am. Water Works Assn.—Jl., vol. 17, no. 2, Feb. 1927, pp. 151-159. Progress report of Subcommittee No. 2 on water softening by chemicals (external treatment); operation of continuous and intermittent lime-soda water-softening plants; economic value of lime-soda softening preliminary to zeolite softeners and to evaporators.

Tri-Sodium Phosphate. Overcoming Boiler-Water Troubles with Tri-Sodium Phosphate, B. C. Sprague. Power, vol. 65, no. 9, Mar. 1, 1927, pp. 321-322, 1 fig. Sulphate waters will not cause adherent scale if enough sodium carbonate is added to maintain certain ratio between carbonate and sulphate in boiler water; at high operating pressures, however, most sodium carbonate decomposes into sodium hydroxide, making it difficult to maintain desired ratio; this difficulty can be avoided by use of tri-sodium phosphate.

BOILER FURNACES

Central Heating Plants. Comparative Tests on Economic Firing of Coke and Gas in Boilers of Central Heating Plants (Vergleichversuche über die wirtschaftliche Verfeuerung von Schmelzkoks und Gas in Zentralheizungskesseln), H. Dieterich. Archiv. für Wärmewirtschaft, vol. 8, no. 2, Feb. 1927, pp. 57-58, 2 figs. Results of tests show that economy of heating of hot-water supply plant can only be determined by means of efficiency tests in actual operation.

Heating Surface. Effect of Direct Heating Surface on Efficiency, J. G. Coutant. Combustion, vol. 16, no. 2, Feb. 1927, pp. 99-100, 2 figs. Boiler furnaces should be designed to obtain highest initial temperature by providing necessary amount of direct heating surface in proportion to fuel burned, special attention being given to methods of combustion that give clear furnace conditions and permit greatest possible transfer of heat by radiation.

Sprinkler Stoker and. The "Cass" Sprinkler Stoker and Furnace. Mech. World, vol. 81, no. 2093, Feb. 11, 1927, pp. 106-107, 4 figs. Sprinkler stoker and self-cleansing furnace can be either of natural-draft or forced-draft type.

BOILER PLANTS

Double Pressure. Double-Pressure Boiler Plant (Höchstdruck-Dampfkesselanlage). V.D.I. Zeit., vol. 71, no. 4, Jan. 22, 1927, pp. 139-140, 2 figs. With view to eliminating costly high-pressure heating surface in zones of low gas temperatures, where heat-transmission and, therefore, rate of evaporation are small, Sulzer Bros. have built experimental boiler embodying two steam generators working at different pressures; high-pressure section works at 110 atmos. gage pressure and has 485 sq. ft. of heating surface in steeply inclined tubes, and radiation superheater of 86 sq. ft. heating surface in front wall of boiler; low-pressure section works at 14 atmos. gage pressure and has 1240 sq. ft. heating surface; whole of output of low-pressure steam is not required to preheat feedwater for high-pressure boiler; surplus is passed to heating mains. See brief translated abstract in Power Engr., vol. 22, no. 252, Mar. 1927, p. 114.

Heat-Balance Study. Corn Products Plants Cut Costs by Heat Balance Study, J. J. Merrill. Power, vol. 65, no. 12, Mar. 22, 1927, pp. 439-441. Summary of problems encountered in reducing coal consumption, together with operating and maintenance costs in four factories of this company located in United States. Abstract of paper read before Midwest Power Conference, Chicago.

BOILER TUBES

Damages. Damages to the Tubes of Small-Tube Water-Tube Boilers, J. Levai. Am. Soc. Naval Engrs.—Jl., vol. 39, no. 1, Feb. 1927, pp. 39-51, 11 figs. Results of inspection of small-tube, water-tube boilers and water pipes subjected to high stresses; tubes were made according to Mannesmann-Pilger process, in which, according to specifications, they were drawn through passes while cold; type of erosions displayed is indication of fatigue of metal.

BOILERMAKING

Boiler-Drum Production. Production of Boiler Drums for High-Pressure Boilers (Die Herstellung von Kesseltrommeln für Hochdruckdampfkessel), B. Schap-

ira. Wärme u. Kälte-Technik, vol. 28, no. 24, Dec. 1, 1926, pp. 287–289, 4 figs. Process of welding drums with water gas, employed at August Thyssen Works; seamless forging of drums at works of F. Krupp and at Reisholz rolling mills at Düsseldorf.

The Manufacture of High-Pressure Boiler Drums. Engineer, vol. 143, no. 3712, Mar. 4, 1927, pp. 246–248, 11 figs. As alternative to forging, firm of Thyssen & Co. has developed process of making seamless drums by welding, which, it is claimed, produces equivalent results at about two-thirds the expense; details of process of manufacture and testing employed by this firm in production of drums for very high pressures.

BOILERS

Electric. The Economic Production of Steam by Electricity, C. J. Wharton. Engineer, vol. 143, no. 3713, Mar. 11, 1927, p. 278, 2 figs. Author deals with two systems of boiler, underlying principle of which is the same; boilers are relatively to output small, of vertical type, with three iron electrodes immersed in water and three-phase current at 3000 to 10,000 volts applied; these two systems are Swedish or Volta type, and Penzold or German system; satisfaction in their use is based on very high efficiency of conversion, extreme cleanliness of operation, small space occupied for large output, complete automatic possibilities, and virtual absence of repairs, maintenance and depreciation. (Abstract.) Paper read before Instn. Eng. Inspectors.

Heat Losses. Losses of Heat Due to Dirt in Boilers (Perte de chaleur due à l'encrassement des chaudières à vapeur), Hellemans. Chimie & Industrie, vol. 16, no. 3, Sept. 1926, pp. 300–308, 3 figs. Points out that boilers deteriorate because of scale formation inside and by soot and cinder deposits on outside; describes methods of cleaning boilers, and gives results of tests.

High-Pressure. Boiler Operates Successfully at 1500 Lb. Power Plant Eng., vol. 31, no. 5, Mar. 1, 1927, pp. 300–301, 2 figs. Boiler plant furnishes steam for manufacture and heating in practically continuous operation; powdered fuel is fired direct from high-speed beater-type unit coal pulverizers.

BOILERS, WATER-TUBE

Vertical. Water Circulation in New Types of Vertical-Tube Boilers (Der Wasserumlauf bei den neuen Steilrohrkesselformen), F. Wintermeyer. Wärme- u. Kälte-Technik, vol. 29, no. 3, Feb. 9, 1927, pp. 29–34, 13 figs. Presents general principle of water circulation; water circulation in modern boiler types; improvement of circulation as required for heating of boiler.

BRAKES

Air. Air-Brake Equipment Reconditioned by Modern Devices, F. W. Curtis. Am. Mach., vol. 66, no. 11, Mar. 17, 1927, pp. 457–459, 8 figs. Denver & Rio Grande Western R.R. Co., Denver, Colo., takes precautions in handling repair work necessary in reconditioning triple valve so that its positive operation in service will be assured; triple-valve parts are reconditioned in Foster semi-automatic valve-finishing machine.

BRASS

Defects. Common Defects in Brass. Metallurgist (Supp. to Engineer), Feb. 25, 1927, pp. 29–30. Common defects encountered in brass articles made from sheet and strip may be divided into two distinct categories, those which are due to defects in metal as cast, and those which arise in course of subsequent operations; defects, such as red stains, occur during course of manufacture; defects of congenital origin show themselves as blisters, spills, laminations, cavities and dirty porous patches, all of which are associated with casting conditions; type of unsoundness which gives rise ultimately to blisters is largely obviated by pouring at high temperature; unsoundness due to shrinkage cavities is much more difficult to eliminate.

Heat Treatment and Hardness. A Study of the Heat Treatment, Microstructure and Hardness of 60:40 Brass, F. H. Clark. Am. Inst. Min. & Met. Engrs.—Trans., no. 1630-E, Mar. 1927, 30 pp., 91 figs. Experimental work to study effect of mechanical work on rolled 60:40 brass, quenched and reheated, and mechanism of twinning in alpha reeds of furnace-cooled specimen; it was desired to determine effect of mechanical work on transformations taking place on reheating quenched material, both at 200 and 470 deg. cent.

Hot-Rolled. Hot Rolled Brass Bars. Soc. Mech. Engrs. (Tokyo)—Jl., vol. 30, no. 117, Jan. 1927, pp. 1–29, 55 figs. Great variation of quality of hot rolled brass bars of same composition and of same manufacture can be detected by examining value of ultimate shearing strain or roughness of surface of test piece which it retains after testing; based on tension and torsion test and examination of inner structure of such materials, author has ascertained that this variation of quality is in accordance with temperature at which bars are presumed to have been rolled; tensile and torsional strength and measures of toughness to be obtained by tension test may fail to furnish any evidence of such variation of quality. (In Japanese.)

BRASS CASTINGS

Water-Cooled Chills. Watercooled Chills. Eng. Progress, vol. 8, no. 2, Feb. 1927, p. 33. Points out disadvantages connected with use of thick-walled cast-iron chills when casting non-ferrous metals, and employment of thin-walled chills cooled by cooling liquid, which also regulates cooling of fluid metal; describes two types developed in Germany which operate at different predetermined temperatures of cooling liquid such as will influence favorably quality of casting; water-cooled chills have proved specially satisfactory in brass foundries.

BRASS FOUNDRIES

Furnace Types. Furnace Types in Brass Foundries. Brass World, vol. 23, no. 2, Feb. 1927, pp. 49–51. Important features of considerable amount of data submitted by more than 80 brass foundries; furnace types and fuels; fluxes and linings receive careful analysis and consideration.

Rearrangement. Rearranging a Brass Foundry. Iron Age, vol. 119, no. 9, Mar. 3, 1927, pp. 636–637, 3 figs. Large increase in capacity from new layout including conveying and sand-handling equipment at 2-story foundry of Kennedy Valve Mfg. Co., Elmira, N. Y.

BRONZES

German Railway. The New R 5 Bronze for German Railways (Der neue Rotgufs R 5 im Eisenbahnbetrieb), Kühnel and Marzahn. Organ für die Fortschritte des Eisenbahnwesens, vol. 82, no. 1, Jan. 15, 1927, pp. 11–14, 4 figs. Results of tests carried out by Railway Administration on copper-tin-zinc alloys to determine hardness, notch hardness, abrasion resistance, etc.; results show that this bronze possesses greater wear resistance than German standard R 9 bronze.

BUSES

Trolley. Trolley Buses (Les trolleybus), M. Perrousset. Société Française des Électriciens—Bul., vol. 6, no. 61, Sept. 1926, pp. 1064–1074. Compares various installation and running costs for trolley buses, street cars and gasoline buses, both in case of new development and in case of modification of existing street-car system; results are shown for various French and English undertakings, conclusion being that trolley bus furnishes economic and remunerative means of transport, provided that sufficient experience in its operation is gathered and applied.

C

CARBON DIOXIDE

Liquid, Vapor Pressure of. The Vapor Pressure of Liquid Carbon Dioxide, C. H. Meyers and M. S. Van Dusen. Refrig. Eng., vol. 13, no. 6, Dec. 1926, pp. 180–185, 3 figs. Vapor pressure was measured by static method over whole temperature range from triple point to critical point with accuracy of 1 part in 10,000; pressure measurements were made with piston gage sensitive to 1 part in 10,000; temperatures were measured with four lead potential terminal platinum resistance thermometers and precision Wheatstone bridge.

CARS, FREIGHT

Ore. Seventy-Ton Ore Cars for C. & N. W. Ry. Mech. Engr., vol. 101, no. 2, Feb. 1927, pp. 104–106, 3 figs. No center sills between bolsters; intermediate sills at sides of hopper 5 ft. $3^1/_2$ in. apart.

CARS, PASSENGER

Dining. Steel Dining Cars for the D. L. & W. Ry. Age, vol. 82, no. 10, Mar. 5, 1927, pp. 663–664, 4 figs. Dining room seats 36 passengers.

Parlor and Kitchen. New Pullman Cars for Continental Service. Ry. Gaz., vol. 46, no. 5, Feb. 4, 1927, pp. 140–146, 11 figs. All-steel parlor and kitchen cars built by Leeds Forge Co. to order of International Sleeping Car Co.

Pullman. New Pullman Cars for Continental Services. Elec. Ry. & Tramway Jl., vol. 56, no. 1386, Feb. 18, 1927, pp. 91–93, 4 figs. Built by Leeds Forge Co., for International Sleeping Car Co., for use on their Nice and Milan service.

CASE-HARDENING

Nitration. Nitration Hardening. Machy. (Lond.), vol. 29, no. 741, Dec. 23, 1926, pp. 393–395, 5 figs. New gas process for case-hardening steel parts developed by Krupps.

CAST IRON

Abrasive Resistance. The Resistance to Wear of Cast Iron in the Case of Sliding Friction. Foundry Trade Jl., vol. 35, no. 549, Feb. 24, 1927, pp. 173–174. Results of experiments carried out by O. H. Lehmann. Translated from Giesserei-Zeitung, nos. 21, 22, 23, Nov. 1, 15, and Dec. 1, 1926. See reference to original article in Eng. Index, 1926, p. 127.

Automotive Industry. Cast Iron in Its Relation to the Automotive Industry, E. J. Lowry. Soc. Automotive Engrs.—Jl., vol. 20, no. 2, Feb. 1927, pp. 277–290, 13 figs. Data presented tend to prove that true hardness is not measurable by any known test; further, that present hardness test is not function of machinability or of wear and that combined carbon bears little relation to any of these three factors; governing features seem to be forms of carbon, structure of iron and quality of materials used; method used in determining quality of material is that of dilation; this test showed that expansion of casting is related to expansion of material used; it is felt that continual experimentation with this method will enlighten many unanswerable questions which arise concerning cast iron.

Diffusion in. Diffusion in Metallic State with Special Reference to Sulphur and Phosphorus in Cast Iron (Die Diffusion im metallischen Zustand, insbesondere die des Schwefels und Phosphor im Gusseisen), F. Roll. Giesserei, vol. 14, no. 1, Jan. 1, 1927, pp. 1–7, 15 figs.; also translated abstract in Foundry Trade Jl., vol. 35, no. 545, Jan. 27, 1927, pp. 83–84, 7 figs. Author describes experiments carried out to determine depth of penetration of sulphur into cast iron and its influence upon structure; he also studied action of solid sulphur, H_2S and SO_2.

Graphitization. Influence of Carbon and Silicon on the Graphitization of White Castings (Influence du carbone et du silicium sur la graphitisation des fontes blanches), P. Chevenard and A. Portevin. Académie des Sciences—Comptes Rendus, vol. 183, no. 25, Dec. 20, 1926, pp. 1283–1284, 1 fig. Presents 3-dimensional diagram to show influence of carbon and silicon on temperature of spontaneous graphitization of pure casting containing less than 0.1 per cent of manganese, sulphur or phosphorus; proportions of carbon and silicon are such as to include most industrial castings and hypoeutectics in iron-carbon system; curves for effect of silicon are approximately hyperbolic and indicate that beyond 2.5 to 3.5 per cent Si, graphitization temperature is almost constant at about 600 deg.

Heat Treatment. The Heat-Treatment and Growth of Cast Iron, J. W. Donaldson. Foundry Trade Jl., vol. 35, nos. 548 and 549, Feb. 17 and 24, 1927, pp. 143–146 and 167–169 and (discussion) 169–171, 13 figs. Account of series of heat-treatment tests carried out on iron cast by filter process; results show that carbide decomposition accompanied by graphite deposition takes place in gray cast iron when subjected to low-temperature heat treatment; stability of carbide is influenced by silicon content, and also by initial combined carbon content; also by temperature and duration of heat treatment.

Sulphur in. Limitation of Sulphur Effect for Ordinary Cast Iron. Soc. Mech. Engrs. (Japan)—Jl., vol. 30, no. 118, Feb. 1927, pp. 47–74, 15 figs. Determination of permissible amount of sulphur in ordinary iron castings for machine construction, mostly by means of mechanical and microscopic tests; for soft iron (over 2 per cent of Si) permissible amount of sulphur is up to 0.12 per cent; for hard iron (about 1.5 per cent of Si) up to 0.10 per cent and for very hard iron (under 1.0 per cent of Si) up to 0.08 per cent. (In Japanese.)

CENTRAL STATIONS

Brooklyn, N. Y. Layout and Operation of the Electrical System of the Brooklyn Edison Company, E. C. M. Stahl. Mech. Eng., vol. 49, no. 4, Apr. 1927, pp. 327–329, 3 figs. Layout and operation of system comprising 25-cycle transmission at 6600 volts to d.c. substations, 60-cycle transmission at 27,000 volts to a.c. substations, the two tied together by 35,000 kw. frequency changer.

Power Generation in Brooklyn, B. Houghton. Mech. Eng., vol. 49, no. 4, Apr. 1927, pp. 309–310. Capacity of Brooklyn Edison Company's stations and extent of territory they serve; organization of operating department and attributes required in its personnel.

The Operation of the Hudson Avenue Generating Station of the Brooklyn Edison Company, W. C. Holmes. Mech. Eng., vol. 49, no. 4, Apr. 1927, pp. 321–326, 6 figs. Data on section of station employing 300-lb. boiler pressure; layout of No. 4 unit, 80,000-kw. cross-compound machine; operation of 300-lb. section units; auxiliary drives; operating results on 300-lb. section.

Des Moines, Iowa. Des Moines Power Station of the Iowa Power and Light Company, R. K. Lane. Iowa Eng. Soc.—Proc., vol. 1, no. 4, Oct. 1926, pp. 51–56. First unit houses two General Electric turbines with capacities of 25,000 kva. and 35,300 kva. together with three 1502-hp. Babcock & Wilcox boilers and two Heine boilers; main generators are equipped with closed-circuit ventilation and cooling systems; main condensers are of two-pass cylindrical type and are equipped for deaerating makeup water returning from storage; boiler room is laid for two rows of boilers with firing aisle between rows; each boiler is equipped with front drive chain-grate stoker; heat balance and water supply; electrical equipment.

Diesel Engined. Street-Car Power Plant Dieselized. Oil Engine Power, vol. 5, no. 3, Mar. 1927, pp. 152–154, 3 figs. Guayaquil, Ecuador, power station substitutes Diesels for steam without service interruption.

East River, New York City. New East River Station of New York Edison Co. Power, vol. 65, no. 11, Mar. 15, 1927, pp. 390–397, 16 figs. Details of equipment, heat balance, etc.

The New East River Station of the New York Edison Co. Opens, J. W. Lieb. Universal Engr., vol. 45, no. 3, Mar. 1927, pp. 23–30, 9 figs. Ultimate capacity of plant will be over 1,000,000 kw.; there is also adequate provision for mill house for pulverizing coal, for coal storage, and for exits for high-tension cable feeders and tie-cable connections; disposal of dust and ashes is provided for through hydraulic flushing system; heat-balance system is of regenerative type, bleeding turbines at three points; present installation consists of two 60,000-kw. 25-cycle, 1500-r.p.m. 3-phase, 11,400-volt General Electric Co. turbo-generators.

Location. Location of Central Power Plants and Coal Selection, S. A. Taylor. Power, vol. 65, no. 8, Feb. 22, 1927, p. 285. Summary of problems drawn from experience in picking location for plant and in securing fuel and water necessary for operation; few mine-mouth locations justified. Abstract. Paper presented before Midwest Power Conference, Chicago.

System Operation. Methods of Obtaining Economical System Operation, H. M. Cook. Mech. Eng., vol. 49, no. 4, Apr. 1927, pp. 313–320, 17 figs. Division-of-load report and its compilation; determining performance; daily performance reports; accurate station instruments prime necessity; lowest overall system economy the desideratum. See also Power Plant Eng., vol. 31, no. 7, Apr. 1, 1927, pp. 395–399, 12 figs.

System Operation of Steam and Mechanical Equipment, H. A. Cox. Mech. Eng., vol. 49, no. 4, Apr. 1927, pp. 310–312, 5 figs. Division of load; selection of fuel; operation changes; maintenance procedure.

CHAIN DRIVE

Silent. Chains for Front-End Drives, F. M. Hawley. Soc. Automotive Engrs.—Jl., vol. 20, no. 1, Jan. 1927, pp. 135–140 and 160, 10 figs. Improved silent chain

is made of stamped, arch-shaped link plates assembled in alternate succession and joined by pins that act as bearings; spacing of pins forms "pitch" of chain; when assembled, chain can be considered flexible gear or rack; projecting teeth of link plates engage sprocket wheels over considerable arc of periphery of each and reduce pressure per tooth, thus minimizing tooth wear.

CHROMIUM STEEL

Properties. Facts and Principles Concerning Steel and Heat Treatment, H. B. Knowlton. Am. Soc. Steel Treating—Trans., vol. 11, no. 3, Mar. 1927, pp. 450–463, 4 figs. Influence of chromium upon properties of steel; Guillet's diagram showing structural composition of steels of varying chromium and carbon contents; composition, properties, uses and methods of heat treating of number of types of chromium steel; stainless steel and principles of corrosion.

COAL

Ash, Clinkering Characteristics. Fusibility of Coal Ash as Related to Clinker Formation, W. A. Selvig, P. Nicholls, W. L. Gardner and W. E. Muntz. Carnegie Inst. of Technology, Min. & Met. Investigations—Bul., no. 29, 1926, 64 pp., 11 figs. Investigation to determine some property of coal ash susceptible to reasonably accurate measurement in laboratory which would serve as index to its clinkering characteristics in boiler furnaces.

Pulverized. See PULVERIZED COAL.

COAL HANDLING

Pneumatic Plants. Handling Coal Pneumatically at the Sittingbourne Works of Edward Lloyd, Limited. Iron & Coal Trades Rev., vol. 114, no. 3076, Feb. 11, 1927, pp. 215–217, 6 figs. Pneumatic plant for handling boiler fuel; cars of coal are brought to one of two lines of track and discharged through grids into reinforced-concrete bunker of 1000 tons' capacity; pipe line extends for full length of bunker; tipper is modification of automatic discharge invented by F. E. Duckham; plant has handled up to 23 tons per hour.

Pneumatic Coal and Ash Conveying Plant. Engineer, vol. 143, no. 3709, Feb. 11, 1927, pp. 163–166, 9 figs., partly on p. 160. Plant erected at Trafford Power Station, Manchester, Eng.; comprises suction plant for discharging coal which arrives either by barge or railway car and for bringing fuel from reserve dumps; mechanical conveyors for transferring coal to storage bunkers, and suction system to clear ashes from boilers.

Pneumatic Handling of Coal, Flue Dust and Ashes Eng. & Boiler House Rev., vol. 40, no. 9, Mar. 1927, pp. 464–471, 4 figs. Details of plant made by Pneumatic Conveyance and Extraction, Ltd.; principles of induction system of pneumatic conveying; advantages of system.

COLD STORAGE

Refrigerating Duty Required by. Cold Storage Operation Data, G. A. Horne. Refrig. Eng., vol. 13, no. 6, Dec. 1926, pp. 177–179 and 185, 3 figs. Data covering refrigerating duty required by cold-storage warehouse for complete year, including average tons of refrigeration month by month, weight of goods handled in and out and few figures representing costs of power-plant operation.

COMBUSTION

Control. Automatic Control of Combustion, T. A. Peebles. Engrs.' Soc. West. Penn.—Proc., vol. 42, no. 9, Dec. 1926, pp. 455–459 and (discussion) 459–464. Automatic control is especially valuable in plants where boilers are operated at capacity far below their maximum; in burning of powdered coal disturbing effect of fuel-bed conditions is done away with and for this reason control is simplified.

CONDENSERS, STEAM

Tubes. Chemicals Effective as Condenser Tube Cleaner, L. M. Forncrook. Power Plant Eng., vol. 31, no. 5, Mar. 1, 1927, pp. 298–300, 5 figs. Tests show both mechanical and chemical cleaning methods effective, but chemicals are preferable in severe cases; oxide on outside of tube prevents any cleaner from making old tube as effective as new ones.

CONDUITS

Pressure. Determination of Maximum Economic Dimensions of a Metal Pressure Conduit and Its Application to Practical Calculations (La solution générale du problème de la détermination des dimensions économiques maximum d'une conduite forcée en métal et son application aux calculs pratiques), P. S. Rini. Houille Blanche, vol. 25, no. 119–120, Nov.-Dec. 1926, pp. 161–164. Presents general solution of problem.

The Design of Turbine Pipe Lines, R. Horowitz. AEG Progress, vol. 2, no. 12, Dec. 1926, pp. 348–358, 22 figs. In designing pipe lines, following factors must be determined: amount of water flowing per unit of time, pressure occurring and pipe track; consideration of material employed, including cast iron, wrought iron, steel, concrete and wood; determination of internal diameter; calculation of wall thickness; laying pipe lines.

CONNECTING RODS

Articulated. The Articulated Connecting Rod—An Alternative Method for Finding Accelerations, W. S. Farrien. Roy. Aeronautical Soc.—Jl., vol. 31, no. 195, Mar. 1927, pp. 234–236, 2 figs. Author refers to Fearn's solution and states that there is alternative graphical solution which gives velocities and accelerations with same accuracy as displacements; it is applicable to any mechanism in one plane, which is based on solution by vector diagrams of typical plane mechanism, the four-bar chain.

Counterbalanced. Possibilities of the Counterbalanced Connecting-Rod, K. D. Wood. Soc. Automotive Engrs.—Jl., vol. 20, no. 3, Mar. 1927, pp. 397–401, 6 figs. Geared balancer proposed by author consists of pair of small shafts geared to run at crankshaft speed in opposite directions, each shaft carrying pair of weights that produce rotating centrifugal couple; center lines of shafts must lie in same plane, which must also pass through center line of crankshaft; one weight on each shaft rotates in one plane and other weights rotate in plane that is parallel to and short distance away from first plane.

CONVEYORS

Belt. Selection, Installation and Care of Belt Conveyors, W. E. Phillips. Cement, Mill & Quarry, vol. 30, no. 5, Mar. 5, 1927, pp. 19–25, 2 figs. To take utmost advantage of possibilities that belt conveyor offers, four things are required: (1) low coefficient of friction with its attendant low power consumption, (2) long belt life, (3) low rate of depreciation, and (4) low maintenance cost; service given by conveyor depends on construction of idlers.

The Belt Conveyor and Its Advantages. Indus. Mgmt. (Lond.), vol. 14, no. 2, Feb. 1927, pp. 47–48. Advantages of band conveyor over any other type of conveyor.

Unusual Conveyor Problem at Cincinnati Plant, R. A. Goodwin. Cement, Mill & Quarry, vol. 30, no. 3, Feb. 5, 1927, pp. 18–20, 5 figs. One of longest belt conveyors in sand and gravel industry was installed at plant of Ohio Gravel Ballast Co., Cincinnati; belt is supported on rollers equipped with Timken-roller bearings; entire structure which carries belt is of steel; rubber belt for both conveyors.

Dual. Dual or Multi-Purpose Conveyors, G. F. Zimmer. Indus. Mgmt. (Lond.), vol. 14, no. 2, Feb. 1927, pp. 41–46 and 50, 7 figs. Conveying appliances by means of which, in addition to conveying from place to place of material, such subsidiary functions as sifting, picking over, assembling, painting, enameling, heating, cooling, etc., are carried out at same time.

Electric Drive. Application of Electric Drive to Conveyors, R. F. Emerson. Eng. World, vol. 30, no. 3, Mar. 1927, pp. 143–150, 14 figs. Describes more important and generally used types of conveyors, together with their load characteristics and sort of work to which they are most adaptable; power requirements; different types of a.c. and d.c. motors and their control.

COPPER ALLOYS

Hardenable. Notes on the Atomic Behavior of Hardenable Copper Alloys, E. C. Bain. Am. Inst. Min. & Met. Engrs.—Trans., no. 1657-E, Feb. 1927, 8 pp., 3 figs. Results of investigation to discover fundamental atomic conditions existing in Corson's high-copper alloys hardenable by means of silicide solution and reprecipitation; results show that very perfect crystallinity exists in solid solutions prepared at high temperature to contain as much dissolved silicide as possible.

Nickel Silver. Casting of Nickel Silver, H. Mappin. Metal Industry (Lond.), vol. 30, no. 6, Feb. 11, 1927, p. 164. Casting consists in heating constituent metals together, and resultant alloy is poured into mold and finally removed as solid ingot; nickel silver, which is alloy of copper, nickel and zinc, is hard bright metal and owing to its high malleability and ductility, it is produced in enormous quantities for manufacture of electroplated articles.

COST ACCOUNTING

Machine-Hour Rate. The Machine-Hour Rate, G. W. Tripp. Machy. (Lond.), vol. 29, no. 745, Jan. 20, 1927, pp. 516–518, 1 fig. Simple method of determining overhead; principal constituents of overhead; charges which vary for each machine; saving of clerical work by grouping; example of application; advantages of machine-hour rate.

COTTON

Carding. Theory and Practice in Cotton Carding. Textile World, vol. 71, no. 11, Mar. 12, 1927, pp. 43–45, 2 figs. How good carding may be accomplished by adopting certain methods for preparing mix, using waste, getting good laps on pickers, caring for card clothing, stripping, cleaning, grinding and setting; methods for calculating speed, production, draft and weight of silver.

Moisture Relation. The Moisture Relations of Cotton, A. R. Urquhart. Textile Inst—Jl., vol. 18, no. 2, Feb. 1927, pp. T55–T72, 2 figs. Absorption of water by cotton mercerized with and without tension.

CRANES

Austrian Types. Modern Hoisting Equipment (Neuere Hebezeuge), R. Dub. Fördertechnik u. Frachtverkehr, vol. 19, nos. 24, 25 and 26, Nov. 26, Dec. 10 and 24, 1926, pp. 367–372, 387–390 and 403–407, 15 figs. Details, and types of new cranes built in Austria.

Girder Design. The Economics of Crane Girder Design, E. G. Fiegehen. Engineer, vol. 143, no. 3711, Feb. 25, 1927, pp. 204–205, 1 fig. Discusses types of girders in common use, namely: rolled steel joists, plate-web girder with single or double webs, lattice-web girders and 4-girder construction with horizontal bracings.

Ingot Tongs. The Gripping Force of Ingot Tongs, W. E. Wright. Engineering, vol. 123, no. 3190, Mar. 4, 1927, pp. 274–275, 6 figs. Investigations in order to discover reason why set of gripping tongs on newly built soaking-pit crane would not grip as desired; crane was intended to handle ingots, thickness of which varied from 8 to 20 in.; action of tongs and calculation of forces involved.

CUPOLAS

Pulverized Coal Auxiliary Firing. Cupolas with Pulverized-Coal Auxiliary Firing (Kuppelofen mit Kohlenstaub-Zusatzfeuerung), U. Lohse. V.D.I. Zeit., vol. 71, no. 7, Feb. 12, 1927, pp. 233–235, 10 figs. Good results have been obtained with use of pulverized coal as additional source of heat in foundry shaft furnace; details of equipment employed.

Safety Prop. Safety Prop for Use in Dropping Cupola Doors. Iron Age, vol. 119, no. 9, Mar. 3, 1927, p. 643, 1 fig. Safety prop for foundry cupolas, intended to take place of steel bar prop commonly used, is made by Berkshire Mfg. Co., Cleveland.

D

DIES

Adjustable Punches. Progressive Die with Adjustable Punches, F. Server. Machy. (N. Y.), vol. 33, no. 7, Mar. 1927, pp. 502–504, 4 figs. One of principal objects in designing die was to provide means for adjusting independently forming punches which advance from sides and form small eyes on edges of work; die is designed to take flat steel sheared to required width and in standard lengths of 14 ft.

Forming. Forming Dies for a Tapered Tube, E. Heller. Machy. (N. Y.), vol. 33, no. 7, Mar. 1927, pp. 487–489, 7 figs. Making die blocks for tapered section; turning blocks for forming punch; difficulty in shaping tube.

DIESEL ENGINES

A.E.G. Marine. 4000-Hp. A.E.G. Marine Oil Engines (4000 PSi-AEG-Schiffsölmaschinen). Automobil-Rundschau, vol. 29, nos. 1, 2 and 3, Jan. 1, 15 and Feb. 1, 1927, pp. 5–10, 23–26, and 46–48, 18 figs. Engines built for Prince Line according to design of Burmeister & Wayne, Copenhagen, but with some modifications of their Danish prototype; each engine has 8 cylinders working one crankshaft; flywheel is at rear end of engine, and 3-stage injector air pump, which delivers compressed air required for injection of fuel is at front end.

Airless-Injection. Bethlehem Steel Company's-Unit Diesel. Oil Engine Power, vol. 5, no. 3, Mar. 1927, pp. 166–169, 6 figs. Trunk-piston two-cycle engine with airless injection and separate air pump on production basis.

Compressorless. A 950 B.H.P. Compressorless Engine. Brit. Motorship, vol. 7, no. 84, Mar. 1927, pp. 434–435, 3 figs. Trunk-piston Deutz 6-cylinder engine for installation in cargo vessel.

Electric-Generator Drive. Adaptation of the Grazer Diesel Engine to Electric Driving (Die Anpassung des Grazer Dieselmotors an die Forderungen der Elektrotechnik), E. Flatz. Elektrotechnik u. Maschinenbau, vol. 44, no. 39, Sept. 26, 1926, pp. 736–740, 5 figs. Described chief improvements in Diesel engine built by Grazer Works, Austria, when applied to driving electric generators; one improvement consists of cam-operated roller on end of fuel valve lever being mounted eccentrically on its spindle, this spindle being rotated through links from fuel-pump shaft, which is controlled by governor; piston-cooling arrangements with telescopic pipes and metallic packings; forced-lubrication system with special arrangements for preventing leakage of oil into crankcase. See brief translated abstract in Sci. Abstracts, Section B, vol. 30, part 1, Jan. 25, 1927, pp. 10–11.

Fuel Indicators. The Baulino Continuous Fuel Indicator. Engineer, vol. 143, no. 3709, Feb. 11, 1927, pp. 157–158, 2 figs. Apparatus developed by C. Baulino and adopted by Italian Navy for use on submarine engines; it contains no moving parts and depends on application of known principles of hydrodynamics.

Fuel Valves. Setting the Fuel Valve of an Air-Injection Diesel, A. B. Newell. Power, vol. 65, no. 10, Mar. 8, 1927, pp. 369–370, 2 figs. Most accurate method is what is known as "setting with air;" by this method crank is first set at correct angle; then air inlet valve is blocked open, commonly by slipping thin block of wood between roller and cam to hold them apart; it will then be possible to hear what is going on within cylinder by listening at air-inlet breather pipe.

Power Costs. What Are Diesel Engine Power Costs? H. C. Thuerk. Elec. World, vol. 89, no. 10, Mar. 5, 1927, pp. 493–496, 4 figs. Operating data from 58 Diesel-engine power plants taken as basis for computing fixed charges, operating and maintenance costs.

Supercharging. Supercharging Diesel Machinery. Mar. Eng. & Shipg. Age, vol. 32, no. 3, Mar. 1927, pp. 133–135, 4 figs. New method of reducing weight and cost by use of exhaust-gas turbine-driven blowers.

DRYING

Hot Gases for. Heat Economy of Drying With Hot Gases (Die Wärmewirtschaft bei der Trocknung mit direkten Feuergasen), W. Graulich. Chemiker-Zeitung, vol. 50, no. 112, Dec. 8, 1926, pp. 921–922. From thermochemical data, heat economy of drying material by means of hot gases drawn directly from fire has been calculated (1) when gases are passed straight over materials, and (2) when gases are first used to preheat material by passing them around drying container and then backwards over stream of damp material in such a way that issuing gases are saturated with water vapor at 80 to 150 deg. See brief translated abstract in Chem. & Industry, vol. 46, no. 3, Jan. 21, 1927, p. 31.

DURALUMIN

Heat Treatment. The Heat Treatment of Duralumin, W. Nelson. Aviation, vol. 22, no. 8, Feb. 21, 1927, pp. 362, 365, 2 figs. When certain light aluminum alloys are heat treated, quenched and aged, there is considerable improvement in their tensile properties; there is leaning towards use of electric furnaces for heat treating this alloy to reduce possible dangers of

corrosion from nitrate salts used in baths; this measure appears desirable but uniformity of heating and accurate control of temperature, both obtainable with salt baths, are very important factors.

DYNAMOMETERS

Induction. Induction Dynamometers (Das Induktionsdynamometer), A. Täuber-Gretler. Schweiz, Elektrotechnischer Verein—Bul., vol. 17, no. 12, Dec. 1926, pp. 545–566, 11 figs. Decsribes electrodynamic measuring instrument, having electrodynamic controlling force instead of mechanical controlling force produced by spiral springs; examples of its application, especially as frequency meter.

E

EDUCATION, ENGINEERING

Curricula. A Study of Engineering Curricula, W. C. John. Jl. Eng. Education, vol. 17, no. 5, Jan. 1927, pp. 454–513, 17 figs. Deals with requirements for entrance and for graduation in colleges which grant first degrees in engineering; graphical summaries of combined requirements for admission and for graduation; comparative summary and analysis of graduation requirements in five principal engineering curricula; entrance requirements.

A Study of Evolutionary Trends in Engineering Curricula. Jl. of Eng. Education, vol. 17, no. 6, Feb. 1927, pp. 551–585, 11 figs. Traces trend of evolution in five major engineering curricula in order that their present state may be defined in terms of direction as well as position.

ELECTRIC FURNACES

Diagram for. A Diagram for Electric Furnaces (Diagramme de fonctionnement des fours électriques), J. Bethenod. Revue Générale de l'Électricité, vol. 20, no. 20, Nov. 13, 1926, pp. 697–698, 1 fig. Refers to work by E. de Loisy, published in Revue de Métallurgie, May 1926, developing critical analysis of previous work by P. Bergeon and E. Rieke; describes construction of diagram based upon work of these investigators; by aid of diagram, functioning of a.c. furnaces can be more closely studied, and results of theoretical investigations can be applied to industrial operation; diagram is of circular type which has been previously used for calculations relating to induction motors; with it, if any one of 6 factors which enter into calculations is known, other 5 can be calculated or deducted from figure. See brief translated abstract in Sci. Abstracts (Sect. B), vol. 30, part 2, Feb. 25, 1927, pp. 74–75; and reference to article by De Loisy in Eng. Index 1926, p. 257.

Heat-Treating. Heat Treating of Castings in Electric Furnaces, J. L. Faden. Fuels and Furnaces, vol. 5, no. 2, Feb. 1927, pp. 225–226, 3 figs. Castings for machine parts at Whitin Machine Works, Whitinsville, Mass. are carburized and annealed in six box-type electric furnaces which were recently installed.

High-Frequency. Contributions to the Theory of High-Frequency Electric Furnaces (Etude théorique du rendement du four électrique à haute fréquence alimenté par alternateur), M. G. Ribaud. Jl. de Physique et le Radium, vol. 7, no. 8, Aug. 1926, pp. 250–256, 1 fig. Supplementary to article upon high-frequency furnaces, published in same journal in 1923; mathematical calculations made by Northrup relating to use of alternating currents for high-frequency furnaces are criticized as being based upon unreliable hypotheses and results obtained by him are considered untrustworthy; author's examination of theoretical data leads him to conclusion that for each furnace and substance there exists frequency at which output attains maximum and constant figure; this maximum is practically independent of size of furnace, but it decreases as electrical resistance of substance diminishes by heat. See brief translated abstract in Sci. Abstracts (Section B), vol. 30, part 1, Jan. 25, 1927, p. 21.

Melting. Electric Furnaces for Melting Metal. Forging—Stamping—Heat Treating, vol. 12, no. 2, Feb. 1927, pp. 41–43. Limitations and applications of electric furnace; alloy and tool steels; steel castings; cast iron; economics of electric melting; malleable iron; permanent-mold castings; non-ferrous metallurgy; electric heating furnaces; electrode control; high-frequency furnace.

ELECTRIC LOCOMOTIVES

French. Powerful Locmotives Built for Paris-Orléans Railway. Elec. Ry. Jl., vol. 69, no. 11, Mar. 12, 1927, p. 458, 1 fig. Designed for maximum speed of 81 mi. per hr.; each axle has individual drive.

Single-Axle Drive. Electric Express Locomotives with Single-Axle Drive (Elektrische Schnellzuglokomotive mit Einzelachsantrieb), W. Kleinow. Elektrische Bahnen, vol. 3, no. 2, Feb. 15, 1927, pp. 41–53, 21 figs. Details of 2-Do-I locomotive constructed for German State Railway by German General Electric Co. (A.E.G.); special advantages of selected drive; details of driving gear, framework, motors, transformers and steering gear; operating results.

Swiss. Over the Loetschberg on a 4500-hp. Locomotive, T. Rich. Elec. Rev., vol. 100, no. 2570, Feb. 25, 1927, pp. 287–289, 5 figs. Modern electric-railway practice, embodying use of new Sécheron locomotive employing 12 motors in 6 units, and new quill spring drive.

The New Lötschberg Type 1 AAA-AAA1 Locomotive (Die neuen Lötschberg-Lokomotiven Type 1AAA-AAA1), G. L. Meyfarth. Elektrische Bahnen, vol. 3, no. 2, Feb. 15, 1927, pp. 53–65, 18 figs. Details of two new locomotives placed in service on Bern-Lötschberg-Simplon line in summer of 1926; designed by S. A. des Ateliers de Sécheron, Geneva; mechanical and electrical parts.

ELECTRIC WELDING, ARC

Pipe. Pipe Welding, J. F. Lincoln. Am Welding Soc.—Jl., vol. 6, no. 1, Jan. 1927, pp. 8–14, 5 figs. Deals with automatic arc welding of pipe and hand welding of field joints for construction of pipe line.

Steel Pipes. Arc Welded Steel Pipe for High Pressure Mains for New York City, W. Schenstrom. Am. Welding Soc.—Jl., vol. 6, no. 2, Feb. 1927, pp. 30–36. First section of large-size diameter, electrically welded water pipe to be installed in large city in United States; it is 48-in. I.D. pipe made of 1/2-in. flange steel, welded inside and out; results of tests.

Structural Steel. Electric Arc Welding of Steel Structures—Design and Organization, H. E. Grove. Am. Welding Soc.—Jl., vol. 6, no. 1, Jan. 1927, pp. 24–40, 16 figs. Outline of procedure adopted in Commonwealth of Australia by superintendent of Metropolitan Gas Co.; in this welding organization no rivets are used, or bolts other than those required for tacking purposes; amount of metal deposited on welded joint is prescribed by universal meter of 45 deg., gage of electrode used, inches of weld per electrode, and number of runs.

ELEVATORS

Automatic. Electric Elevator Practice, F. L. Boissonnault. Elec. Jl., vol. 24, no. 3, Mar. 1927, pp. 111–114, 9 figs. Automatic elevators; auxiliary apparatus; dual control; brakes.

Controllers. How Push-Button Type Elevator Controllers Operate, C. A. Armstrong. Power, vol. 65, no. 11, Mar. 15, 1927, pp. 398–400, 3 figs. Operation of constant-pressure push-button type and two-flow automatic type.

Traction-Type. Traction-Type Electric Elevators (Die neuzeitliche Entwicklung elektrischer Aufzüge), F. Mörtzsch. Elektrotechnik u. Maschinenbau, vol. 44, no. 52, Dec. 26, 1926, pp. 941–946, 5 figs. European designers are gradually introducing traction type of drive, which has decided advantages over drum type formerly used exclusively; aside from gain because of less floor space and increased safety, main advantage is that same driving set is suitable for any height, which gives manufacturer excellent basis for standardization; diagram of control system and description of regulating and braking methods. See brief translated abstract in Elec. World, vol. 89, no. 9, Feb. 26, 1927, p. 466.

EMPLOYMENT MANAGEMENT

Railways. Training Understudies for Executives in Railroad Service, W. J. Cunningham, J. J. Hill. New York Railroad Club—Official Proc., vol. 37, no. 4, Mar. 1927, pp. 8265–8303. Includes also following contributions: Prospects for Advancement, J. C. Clark; Why Railroad Employment is Unattractive for College Men, R. L. Sackett; Exacting Job Confronts the Young Man Who Seeks a Career in Railroading, J. G. Morgan; The Lowest Rung of the Ladder Starting Point for the Graduate Ambitious to Gain Promotion, F. H. Dixon; Experience in Personnel, W. W. Bates; Apprenticeship Training, W. M. Daniels and T. DeWitt Cuyler; Young Men Need a Change, Also Personal Qualifications for the Attainment of their Ambition, J. S. Droege; Effect of Seniority Rules in Preventing Promotion of the Best Talent Among Employees, S. O. Dumm; Give the Workers a Chance, N. C. Miller; Great Human Adventure College Students Find in Serving Their Fellow Citizens, R. S. Binkerd; and Prof. Cunningham's closure.

Selecting Employees. Elimination Work in the Selection of Personnel. Mech. Eng., vol. 29, no. 3, Mar. 1927, p. 218. Waste elimination in selection of personnel demands job analysis, personality analysis, and job betterment in order that best opportunities may be made available for workers and that as exact information as possible may be on hand in regard to type of work which worker is expected to do.

ENERGY

Thermal, Ocean Waters as Source of. The Utilization of Natural Luke-Warm Waters (A propos de l'utilisation des eaux tièdes naturelles), P. Drosne. Chaleur & Industrie, vol. 8, no. 81, Jan. 1927, pp. 3–8, 3 figs. Points out that laws of evolution of hot or luke-warm liquids will greatly aid in technical problems of boilers, carburetors, etc.; utilizable and non-utilizable energies; ocean waters as source of thermal energy; author examines thermoelastic condition of oceans in order to determine true origin of difference in temperature; it is shown that warm currents of oceans are not produced directly by solar heat; this is only effected by intermediate action of atmosphere.

Utilization of the Thermal Energy of Tropical Seas (L'utilisation de l'energie thermique des mers tropicales). Génie Civil, vol. 90, no. 3, Jan. 15, 1927, p. 82. Also brief translated abstract in Power Engr., vol. 22, no. 252, Mar. 1927, p. 116. Several years ago, Italian engineers, C. Boggia and M. Dornig, devised scheme for utilizing thermal energy of tropical seas in power plant using easily volatile liquid as its working fluid; original proposal was for erection of station on reinforced-concrete raft few miles from shore; cold water was to be drawn from depth of 2300 ft. at rate of 14,800 cu. ft. per sec. through vertical pipe 49 ft. in diameter and discharged at 9 deg. cent. at depth of 980 ft. after passing through brass tubes of condensers, having 7,280,000 sq. ft. of cooling surface; instead of floating power station it is now proposed that works should be built underground with tunnel going out to sea for cold-water supply and return.

F

FILES

Manufacture. A Glimpse in a Modern File Shop. Am. Mach., vol. 66, nos. 6 and 8, Feb. 10 and 24, 1927, pp. 259–261 and 325–327, 10 figs. File shop of Simonds Saw & Steel Co., Fitchburg, Mass.; blanks forged on standard machines; filemaker's nomenclature misleading; shaping blanks in roller dies; preparation for cutting teeth. Feb. 24: Special grinding machinery for finishing blanks; how teeth are cut.

FIRE EXTINGUISHERS

Carbon-Dioxide. Carbon-Doxide Used to Extinguish Fires in Electrical Equipment, C. C. Ragsdale. Power, vol. 65, no. 10, Mar. 8, 1927, pp. 356–358, 3 figs. In principle system consists of battery of tanks of compressed CO_2, connected by pipes to compartments and housing of electrical equipment in which fire may occur.

Electric Generators. Generator Fire-Extinguishing System at Edgar Station, G. R. Davison. Elec. World, vol. 89, no. 11, Mar. 12, 1927, pp. 545–547, 6 figs. Multi-cylinder installation employs liquid CO_2 under 850 lb. pressure; tests show 20 per cent content can be obtained in 15 sec.; excess gas content desirable precaution against air leakage.

FLAX

Yarns. Some Properties of Flax Yarns, W. H. Gibson. Textile Inst.—Jl., vol. 18, no. 2, Feb. 1927, pp. P20–P22. Results of research.

FLIGHT

Soaring. Observations of Soaring Birds (Einige Beobachtungen an segelnden Meervögeln), F. Noltenius. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 17, no. 24, Dec. 28, 1926, pp. 554–555. Observations on birds over southern part of Atlantic Ocean lead to conclusion that these birds utilize rising air currents formed when wind hits waves; albatrosses fly in weak wind very close to surface; only in strong wind do they rise to height of mast top of ship; if this is true, it is evident that glider flight over ocean is not possible for human beings.

FLOW METERS

Care and Inspection. Care and Inspection of Electric Steam-Flow Meters, J. E. Housley. Power, vol. 65, no. 8, Feb. 22, 1927, pp. 288–290, 5 figs. Author tells how he takes care of his steam-flow meters and checks their operation.

FLOW OF WATER

Sector Regulators. Sector Regulators, F. J. Taylor. Water & Water Eng., vol. 29, no. 338, Feb. 21, 1927, pp. 47–49, 8 figs. Sector regulator is comparatively recent introduction and takes form of sector spanning opening through which water is intended to pass, but it does not shut down upon sill of opening, but sinks into pit to any predetermined depth, and thus maintains definite depth of water over it.

FLYING BOATS

Fokker. The Fokker B.III. Flight, vol. 19, no. 6, Feb. 10, 1927, p. 67, 2 figs. New metal-hull flying boat with Napier "Lion" engine.

FLYWHEELS

Horsepower Output. Horsepower Output of Flywheels, B. J. Shillito. Mech. World, vol. 81, no. 2095, Feb. 25, 1927, pp. 137–138, 4 figs. Type of instrument that is quite suitable for such fine measurements consists of drum, driven from flywheel, either direct coupled to same, or driven through spur gear without backlash.

FORGING

Machines. Forging Machines (Les machines à forger), L. Gendron. Pratique des Industries Mécaniques, vol. 9, no. 12, Mar. 1927, pp. 485–494, 20 figs. Points out defects of older types; safety devices, improvements in machine; machines for low-temperature forging; recent innovations.

FOUNDRIES

Materials Handling in. Materials-Handling Practice at the Foundry Show in Düsseldorf, 1925 (Das Transportwesen auf der 4 Giessereifachausstellung in Düsseldorf 1925), A. Riebold. Giesserei, vol. 14, nos. 4 and 5, Jan. 22 and 29, 1927, pp. 49–57 and 65–71, 36 figs. Review of exhibits of materials-handling and transport equipment.

Scrap, Briquetting. Briquetting Cast-Iron Turnings and Borings. Machy. (Lond.), vol. 29, no. 740, Mar. 3, 1927, pp. 712–714, 1 fig. Methods of briquetting divide themselves into two classes, according to whether or not borings are subjected to high pressures, and methods may be classified under two headings; (1) formation of briquets using chemical binders, with or without moderate pressures; (2) formation of briquets by means of high pressures, with or without use of chemical binders; grading of borings and turnings; remelting briquetted borings.

FUELS. See COAL; LIGNITE; OIL FUEL; PULVERIZED COAL.

FURNACES, HEATING

Regulation of Atmospheres. Furnace Atmosphere is Regulated Automatically by Meters, R. Rimbach and J. A. Stein. Iron Trade Rev., vol. 80, no. 7, Feb. 17, 1927, p. 456. Regulation of furnace combustion conditions to give desired furnace atmospheres is accomplished by use of suitable flue-gas analyzing equipment so as to obtain better uniformity of product with lower fuel consumption; types of furnaces include sheet and pair, continuous annealing, heating and reheating furnaces for billets, open and box annealing, and certain forging furnaces; installation often consists of electric CO meter, which is sometimes augmented by electric CO_2.

FURNACES, INDUSTRIAL.

Design. Practical Industrial Furnace Design, M. H. Mawhinney. Forging—Stamping—Heat Treating, vol. 12, no. 2, Feb. 1927, pp. 44–47, 5 figs. Various methods of firing furnaces; fuel consumptions and dimensions of interior construction; principles of operation.

G

GAGES

Three-Point. An Analysis of the Three-Point Gauge, E. A. Limming. Machy. (Lond.), vol. 29, no. 750, Feb. 24, 1927, pp. 674–676, 6 figs. If radius of closed path of central point of three-point gage be no greater than one-sixth of length of one of its arms, despite nature of corresponding holes, gage will, from aspect dealt with, be unable to distinguish them from circular holes; in practice terminal surfaces of such gages are more than geometrical points, but analysis shows extent to which errors could go undetected.

GAS ENGINES

Throttle-Governed. Correct Timing of Ignition in Throttle-Governed Gas Engines, N. Harwood. Mech. World, vol. 81, no. 2094, Feb. 18, 1927, pp. 119–120, 4 figs. Experiments to find correct timing of ignition for minimum gas consumption at various loads and to show by independent method that strength of mixture in throttle-governed engines may decrease with increase of load.

GASES

Heat of Evaporation. Heat of Evaporation of Certain Condensed Gases at Low Pressures (Die Verdampfungswärme einiger kondensierter Gase bei kleinen Drucken), A. Eucken and E. Donath. Zeit. fur Physikalische Chemie, vol. 124, no. 3/4, Nov. 28, 1926, pp. 181–203, 2 figs. Account of experiments, apparatus employed and results obtained; measurements were made on solid and liquid ammonia, solid CO_2, etc.

GEAR CUTTING

Generators. Spiral Bevel Gear Generating Machine, H. Shaw. Machy. (Lond.), vol. 29, no. 748, Feb. 10, 1927, p. 610, 3 figs. As high price of spiral bevel-gear machine is due to complications necessary to enable it to cut bevel gears of varying sizes, it would pay manufacturer, who is continually producing bevel gears of one size in large quantities, to install machines to produce only one size of gear, and in this way reduce cost of plant; presents principle upon which machine of this kind would work.

Machines. Waltham Improved Automatic Pinion and Gear Cutting Machine. Am. Mach., vol. 66, no. 9, Mar. 3, 1927, p. 392, 1 fig. Magazine-feeding mechanism has been added to 1 1/2-in. pinion and gear-cutting machine, for cutting solid or hollow pinions on high-production basis.

GEARS

Epicyclic. The Furness Gear. Auto-Motor Jl., vol. 22, no. 9, Mar. 3, 1927, pp. 189–190, 2 figs. Epicyclic gear which provides four forward speeds and reverse, with interesting form of control.

Noiseless. Noiseless Gears (Geräuschlos arbeitende Zahnradgetriebe), Herford. Gewerbefleiss, vol. 106, no. 1, Jan. 1927, pp. 8–10, 8 figs. Describes material known as Novotext made by German General Elec. Co. (AEG) which has unusual noise-reducing properties; it has cohesive structure of almost as great strength as cast iron and therefore requires no steel reinforcement and is resistant to water, oil, heat, and, to a certain degree, to acid.

Starter, Manufacture. Production of Starter Gears in a Small Shop, F. W. Curtis. Am. Mech., vol. 66, no. 7, Feb. 17, 1927, pp. 281–284, 12 figs. Describes each of 11 operations in order.

Timing. Development of the Silent Timing-Gear, E. F. Behning. Soc. Automotive Engrs.—Jl., vol. 20, no. 1, Jan. 1927, pp. 129–132. Development of laminated, phenolic, condensation products, and of flexible-web cam gear made of composition materials; latter is made by bonding together in laminated form various bases such as paper, linen, canvas, or sheet asbestos, depending upon grade that is to be produced, with synthetic, phenolic, condensation resin; gears made of composition material, will, it is claimed, obviate unsatisfactory service and noise; they admit of quantity production, reduce expensive teardowns on production line to minimum and assure silent, positive operation after car is in service.

Timing-Gear Development, R. S. Drummond. Soc. Automotive Engrs.—Jl., vol. 20, no. 1, Jan. 1927, pp. 132–135. After outlining present status of forms of drive for timing-gear trains, author described modifications of gear design made by company he represents to overcome noise that involves lengthening gear teeth for given pitch; various modifications in this regard were made, and one having 16-pitch teeth with 12-pitch length had 10,000 miles of use in fourth speed without developing excessive wear; further development was use of case-hardened timing gears for motor-coach engines; characteristics of so-called antistub gears.

Train Forming Closed Circuit. A Gear Problem —Comment, H. Walker. Machy. (Lond.), vol. 29, no. 749, Feb. 17, 1927, pp. 651–652, 3 figs. Describes gear train for multiple drilling machine; presents simple rule for design of gear trains which form closed circuit. Refers to article in same journal, Jan. 1927.

GLUES

Manufacture and Properties. Glues, H. Burdett. Roy. Aeronautical Soc.—Jl., vol. 31, no. 195, Mar. 1927, pp. 255–262, 1 fig. Two most commonly used kinds of glues are casein and animal glues; essential qualities of good glue; manufacture of hide or skin glues and of bone glues.

GOVERNORS

Oil-Pressure. The Working of an Oil-Pressure Governor Under Disturbed Flow (Étude analytique du fonctionnement, au cours d'une pertubation, d'un Groupe électrogène pourvu d'un Régulateur à pression d'huile), M. Barbillion. Houille Blanche, vol. 25, no. 117–118, Sept.-Oct. 1926, pp. 138–143, 5 figs. Explains mechanism of tachiometric oil-pressure governor of hydroelectric unit and follows its working under stress of varying velocities of flow, equations being included to calculate kinetic energy of unit in irregular feed; characteristic equation of operation of control is also worked out.

GRINDING

Crankshafts. A Difficult Job of Production Grinding. Am. Mach., vol. 66, no. 12, Mar. 24, 1927, pp. 485–488, 10 figs. Methods employed by Brown & Sharpe Mfg. Co. in making small, double-throw crankshaft.

High-Speed Steel. Grinding High Speed Steel, A. Rousseau. Can. Machy., vol. 37, no. 9, Mar. 3, 1927, pp. 21–22, 1 fig. Discusses difficulties most frequently encountered and most satisfactory methods of overcoming them.

GRINDING MACHINES

Crankpin. Micro Portable Locomotive Crankpin Grinder. Am. Mach., vol. 66, no. 8, Feb. 24, 1927, pp. 350–351, 2 figs. For trueing out-of-round locomotive crankpins.

Outstanding Features of the Churchill Locomotive Outside Crankpin Grinding and Quartering Machine. Brit. Machine Tool Eng., vol. 4, no. 43, Jan.-Feb. 1927, pp. 537–541, 9 figs. Example of machines which have proved successful in various railway shops.

Internal. Internal Grinder Development, C. T. Appleton. Abrasive Industry, vol. 8, no. 3, Mar. 1927, pp. 87–89, 1 fig. Old-style machines necessitated hand plugging at consequent high-production cost; modern machines size work automatically.

Radial-Type. Radial-Type Way Grinding Machine. Am. Mach., vol. 66, no. 8, Feb. 24, 1927, p. 352, 2 figs. Machine of German design consisting of base with traversing table for supporting parts to be ground and heavy, double-arm radial standard of quadrangular form.

H

HARDNESS

Testing. Hardness Testing with Impact Tester (Die Härteprüfung mit dem Fallhärteprüfer), V. Schwarz. Motorwagen, vol. 30, no. 3, Jan. 31, 1927, pp. 51–56, 12 figs. Describes tester developed by author by means of which, it is claimed, method of testing is greatly simplified, and determinations can be made quickly, easily and almost without cost.

HEAT TRANSMISSION

Externally Ribbed Tubes. Transmission of Heat Through Walls of Externally Ribbed Tubes (Sur la transmission de la chaleur à travers les parois des tuyaux à ailettes), J. Merlan. Chaleur & Industrie, vol. 8, no. 81, Jan. 1927, pp. 13–19, 4 figs. Diffusion of heat from outside wall of tube to surrounding air takes place in two manners, namely, by direct radiation and by connection; explains difference between these two methods of transmission; influence of dimensions of rib on diffusive power of heat; conditions for employing ribbed tubes in heat exchangers.

HEATING AND VENTILATION

Churches. Church Heating and Ventilation, A. J. Offner. Heat. & Vent. Mag., vol. 24, nos. 1, 2 and 3, Jan., Feb. and Mar. 1927, pp. 69–74, 72–76 and 68–71, 25 figs. Design problems in houses of worship as affected by their construction and use. Jan.: Location of ventilating system; arrangement for recirculation of air; example of warm-air heating; calculation of air temperatures and volumes. Feb.: Humidifying and rehumidifying; overhead air supply; air exhausted through pew ends; by-passing and control of air; up-feed supply system gravity-exhaust ventilation. Mar.: Ventilation of sunday schools and social halls and choice of fuels for church heating.

HEATING, ELECTRIC

Industrial. Industrial Electric Heat, N. J. Roberts. Nat. Elec. Light Assn.—Bul., vol. 13, no. 12, Dec. 1926, pp. 753–757, and vol. 14, nos. 1 and 2, Jan. and Feb. 1927, pp. 41–50 and 112–114, 20 figs. Dec.: Recent developments in apparatus; factors entering into costs; efficiency of electric heat; heat available for useful work at various temperatures. Jan.: Heat treatment of steel, melting of iron and steel, soaking pits; annealing of sheet and strip; melting of non-ferrous metals; induction furnaces. Feb.: Baking of bread and pastry; vitreous enameling; glass annealing.

HEATING, STEAM

Built-in Radiators. Development of Built-in Heating Units, G. E. Otis. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 33, no. 3, Mar. 1927, pp. 129–134. Invisible radiation unit is essentially different from all other forms of concealed radiation in one respect—it requires no means for accessibility and has none; it is designed to be placed in wall or partition, covered with metal lath or plaster board, and plastered over so that nothing will show but neat opening at bottom and outlet grille; it is designed to give straight, smooth air passages and no provision has been made to create turbulence.

Central. Design of a Small Community Heating Plant, H. L. Alt. Heat. & Vent. Mag., vol. 24, nos. 2 and 3, Feb. and Mar. 1927, pp. 66–68 and 76 and 65–67, 18 figs. Working out calculations and details for central plant and distributing mains.

HOBBING MACHINES

Pfauter. Gear-hobbing Machines. Machy. (Lond.), vol. 29, no. 748, Feb. 10, 1927, pp. 605–607, 8 figs. Original-Pfauter automatic machines are supplied in range of sizes suitable for work varying from small watch pinions 1/4-in. diam. to largest turbine gears of 13-ft. diam., unusual feature of three largest machines is that balancing of load on table and relief of table ways is effected by means of patented hydraulic device.

HYDRAULIC TURBINES

Head Increase by Excess Flow. Using Excess Flow to Increase Head on Turbines. Power Plant Eng., vol. 31, no. 5, Mar. 1, 1927, pp. 314–316, 4 figs. Several devices for increasing head on hydraulic turbines by using excess water in high flow periods have proved economical and convenient at large hydro plants.

Modern Installations. Recent Turbine Installations, I. Moser. AEG Progress, vol. 2, no. 12, Dec. 1926, pp. 341–345, 4 figs. Recent installations by Escher Wyss & Co., Zurich, Switzerland.

Propeller and Kaplan. The Employment of Propeller Turbines and Kaplan Turbines, G. von Troeltsch. AEG Progress, vol. 2, no. 12, Dec. 1926, pp. 332–337, 12 figs. Relationship between efficiency and economy; automatic adjustment of runner vanes renders Kaplan turbine almost equally efficient, over whole range of admissions employed in practice; as propeller turbines are less expensive than Kaplan, it is better, in many cases, to limit regulation of plant to one or two Kaplan turbines, and to install propeller turbines for remainder; satisfactory results obtained with Kaplan turbine in number of stations fully justify its employment within range of utilization determined by careful tests.

HYDROELECTRIC DEVELOPMENTS

Quebec. Hydro-Electric Power Developments on the Gatineau River, J. A. McCrory. Eng. Jl., vol. 10, no. 3, Mar. 1927, pp. 119–129, 12 figs. Important features of Farmers, Chelsea and Paugan power developments of Gatineau Power Co.

HYDROELECTRIC PLANTS

Excess Energy. The Utilisation of Excess Energy in Hydro-Electric Plants. AEG Progress, vol. 2, no. 12, Dec. 1926, pp. 361–369, 14 figs. Utilization of excess energy can be divided into internal and external utilization, under former being included means for increasing utilization of excess water available, and under latter, utilization of excess energy by consumers; storage of excess energy in accumulators; utilization as chemical energy; heat energy in melting and hardening furnaces, electric boilers, cooking and heating apparatus, etc.

Germany. Small Hydro-Electric Plants in Germany, L. Riefstahl. AEG Progress, vol. 2, no. 12, Dec. 1926, pp. 374–378, 10 figs. In such small plants, direct current is generally used; design of d.c. machine, known as Peterson system, giving practically constant voltage, independent of varying turbine speed; employment of machine of this kind in combination with modern high-speed propeller turbine is specially advantageous as dynamo can be directly connected to turbine; employment of small turbine sets is also practical.

Italy. Hydro Stations on the River Lys, Italy (L'aménagement hydroélectrique de la vallée du Lys), T. Pausert. Revue Générale de l'Electricité, vol. 21, no. 1, Jan. 1, 1927, pp. 15–31, 28 figs. Describes nine electric plants situated along 25-mi. stretch of River Lys; in this short run level of river descends from 8000 ft. to 1100 ft. above sea; at suitable intervals, dams were erected across narrow valley, providing stations with average hydraulic head of 750 ft.; prime movers in all plants are of Elton-Wheel type, with capacities of up to 14,000 hp. per unit; stations supply cities of Milan and Turin as well as local demand; to permit tie-in with existing installations energy at 42 and 50 cycles had to be provided; transmission voltages of 45,000, 70,000 and 110,000 are installed to conform to local conditions.

Martin Dam, Ala. Martin Dam Aids Control of Alabama System, F. E. Hale and R. R. Stone. Power Plant Eng., vol. 31, no. 5, Mar. 1, 1927, pp. 284–291, 8 figs. New hydro plant of Alabama Power Co. on Tallapoosa River, with initial installation of 135,000 hp. forms storage project to aid steam and run-of-river plants during low water; principal equipment in Martin Dam plant.

Ontario. Electric Power for Ontario Mines, A. R. Webster. Can. Min. Jl., vol. 47, no. 9, Mar. 4, 1927, pp. 184–188. Hydroelectric power generation and transmission for metal mines of Northern Ontario.

New Campbellford Station Quinte and Trent Valley Power Co. Elec. News, vol. 36, no. 4, Feb. 15, 1927, pp. 25–26 and 44, 7 figs. Power generated is used to generate steam in electric steam boiler, and draws its water by agreement from forebay of Ranney Falls generating station; it will be utilized to generate steam for pulp and paper board mill controlled by allied interests.

New Frankford Generating Station on Trent River. Elec. News, vol. 36, no. 5, Mar. 1, 1927, pp. 27–29, 7 figs. Houses two 1200-kva. horizontal generators, with space for third, driven by vertical turbines of vacuum and Be I runner type; helical bevel gears of 98 per cent efficiency used to step-up speed of water turbines; station particulars.

Planning Problems. Planning Problems on Water Power Plants, S. Füllsack. AEG Progress, vol. 2, no. 12, Dec. 1926, pp. 320–323, 5 figs. Considers problems which lead to compromise in planning of mechanical portion of hydroelectric plants; comparison of German and American installations leads to conclusion that latter operate under less severe guarantees, and have smaller flywheel effects.

Switzerland. The Waggital Hydro-Electric Works.

Water & Water Eng., vol. 29, no. 338, Feb. 21, 1927, pp. 51–53, 4 figs. Includes creation of artificial lake, 1 ¼ sq. mi. in area and capable of holding, 4,950,000,000 cu. ft. of water, and construction of gigantic wall blocking entrance to valley, 590 ft. along crest, 317 ft. high and 246 ft. broad at base, equivalent to 8,100,000 cu. ft. of concrete; installation is purely winter power station (Nov. 1 to Mar. 31); maximum output is 160,000 hp.

Unit Excitation. Unit V. Central Excitation in Hydro-Electric Stations, M. D. Camby. AEG Progress, vol. 2, no. 12, Dec. 1926, pp. 325–329, 3 figs. Discusses most important objections to unit excitations; shows that selection of manner in which excitation energy shall be generated must, in each case, be preceded by careful investigation.

Watertown, N. Y. Municipal Hydro Plant and Street-Lighting System, Watertown, N. Y., J. W. Ackerman. Am. City, vol. 36, no. 3, Mar. 1927, pp. 315–319, 6 figs. Hydroelectric plant is being operated to supply power for pumping water and lighting filter plant and pump house, boulevard bridge, streets and public buildings; equipment consists of three vertical-type hydraulic turbines made by S. Morgan Smith Co.; each is installed in concrete scroll case and discharges through concrete draft tube; series system is used throughout with directional lighting units; comprises 1223 ornamental cast-iron posts fed by underground cables and equipped with octagonal lantern-type tops.

I

INDICATORS

Oil-Engine. Werkspoor Indicator Gear. Engineer, vol. 143, no. 3711, Feb. 25, 1927, p. 209, 6 figs. Presents statement prepared by R. & W. Hawthorn, Leslie & Co., conjointly with Werkspoor Engine Works of Amsterdam in reply to criticism made on low mechanical efficiency and unsatisfactory values of indicated horsepower measured during trials being carried out by Marine Oil Engine Trials Committee of Instn. Mech. Engrs. See also Engineering, vol. 123, no. 3189, Feb. 25, 1927, p. 243, 7 figs.

INDUSTRIAL MANAGEMENT

American Methods in Europe. American Management Methods Applied to Foreign Government Industries, W. Clark. Taylor Soc.—Bul., vol. 12, no. 1, Feb. 1927, pp. 307–311. Author describes his work for American Finance Commission to Poland; American methods are being introduced into Polish industries with good success; there is an impression in European countries that American management and mass production mean same thing, and are therefore not applicable to their problems.

Cost Accounting. See COST ACCOUNTING.

Industrial Psychology. See PSYCHOLOGY.

Inventory Control. Watch the Inventory Dollars, J. H. Rand, Jr. Factory, vol. 38, no. 3, Mar. 1927, pp. 449–452, 2 figs. Sight must not be lost of fact that inventory reduction with its attendant saving on part of consumer of product, may mean decided inventory increase and added cost to producer of this same product, if consumer expects and demands quick upward changes in producer's manufacturing schedules; common sense and proper respect for other men's position must characterize inventory-control policies.

Maintenance System. Orderly Maintenance in a Diversified Manufacturing Plant, F. I. Wheeler, Jr. Am. Mach., vol. 66, nos. 7, 9 and 11, Feb. 17, Mar. 3 and 17, 1927, pp. 277–280, 373–376 and 441–443, 7 figs. Describes maintenance system of plant. Mar. 3: Machine inspection initiated by tickler file; identification of machines; repair history cards; belt inspection, maintenance, and records; upkeep of other transmission equipment. Mar. 17: Power-plant maintenance; control of electric-motor routine inspection and repair; check on fire-protection equipment; value of system and its effect upon production.

Manufacturing-Overhead Control. Controlling Manufacturing Overhead by Standards in Cadillac Plant, E. F. Rauss. Mfg. Industries, vol. 13, no. 2, Feb. 1927, pp. 93–96, 3 figs. Use of these standards facilitates control of major expense items; although at present limited to these major expense items, system may eventually be carried out to minor accounts and thus give complete control over all manufacturing expenditures.

Overhead Cost. Some Central Problems of Overhead Costs, J. M. Clark. Taylor Soc.—Bul., vol. 12, no. 1, Feb. 1927, pp. 287–293. Questions of business policy, of accounting technique and of community efficiency.

Production Capacity. Problem of the Most Favorable Production Capacity (Das Problem der günstigsten Produktionskapazität), H. Kroner. Technik u. Wirtschaft, vol. 20, no. 2, Feb. 1927, pp. 51–54, 1 fig. Production capacity developed from sales capacity; relation between production, production capacity and price; limit capacity.

Production Schedule. Seven Advantages of Production Scheduling, J. F. Hennessey. Indus. Mgmt. (N. Y.), vol. 73, no. 2, Feb. 1927, pp. 93–95, 1 fig. Points out seven separate advantages accruing from production scheduling, as they could be made to apply to almost any industry; deals mainly with methods followed by General Electric Co., and explains in detail different forms used.

Purchasing. A Centralized Purchasing System for the Medium-Sized Plant, R. C. Kelley. Factory, vol. 38, no. 3, Mar. 1927, pp. 479 and 608. Discusses following questions: (1) Can smaller plant adopt purchasing system of larger plant? (2) should purchasing department control taking of inventory? (3) where should material requisitions originate? (4) how many records must purchasing department maintain? (5) how much detailed work can purchasing agent profitably do?

Hand to Mouth Buying, W. O. Jelleme. Taylor Soc.—Bul., vol. 12, no. 1, Feb. 1927, pp. 294–297 and (discussion) 298–302. Appraisal of current buying practice; plan of merchandising control.

Small Plants. Management Methods in the Small Plant, H. P. Wherry. Mfg. Industries, vol. 13, nos. 1 and 2, Jan. and Feb. 1927, pp. 41–44 and 115–119, 10 figs. Jan.: Financial policies and methods of reorganizing accounting, cost and production operations, which produced substantial savings. Feb.: Results from reorganized financial and sales methods in small plant.

Time Study. See TIME STUDY.

INDUSTRIAL MOBILIZATION

National. National Industrial Mobilization, W. S. Lyhne. Iron Age, vol. 119, no. 10, Mar. 10, 1927, pp. 730–731, 1 fig. Coördination of government planning with manufacturing preparedness, designed to save lives, waste and confusion.

INDUSTRIAL ORGANIZATION

Pyramid System. The "Pyramid System" of Administration. Indus. Mgmt. (Lond.), vol. 14, no. 3, Mar. 1927, pp. 94–95, 1 fig. There is fundamental principle underlying all successful staff organization which author terms "Pyramid" system and whether consciously and methodically adhered to, or whether unconsciously and more or less loosely carried out, principle is only one possible, where large bodies of subordinates are working under one head.

INDUSTRIAL PLANTS

Location. Transportation Facilities in Plant Location, H. S. Colburn. Mfg. Industries, vol. 13, no. 2, Feb. 1927, pp. 135–139. Deals with railway, highway, electric and air transportation.

Reorganization. We Pulled Our Plant Together—and Increased Our Profits, H. R. Simonds. Iron Trade Rev., vol. 80, nos. 6 and 7, Feb. 10 and 17, 1927, pp. 387–389 and 453–456, 6 figs. Work of reorganization of plant of Pratt & Whitney Co., Hartford, Conn.; plan for location of departments and general plan operation was devised, based on following points: (1) flow of parts in process through plant in shortest lines from raw material to finished product; (2) relation of each job to each other job to produce maximum efficiency; (3) number of products reduced; (4) grouping of departments so as to reduce supervising personnel; and (5) keeping down expense of rearrangement.

INSULATION, HEAT

Heat Conductivity. The Determination of Heat Conductivity of Technical Insulations (Bestimmung der Wärmeleitfähigkeit werkstattmässig hergestellter Isolierungen), R. Pohl. Archiv für Elektrotechnik, vol. 17, no. 5, Jan. 6, 1927, pp. 473–480, 7 figs. Discusses method of determining heat conductivity of an insulation from bend in temperature curve of a conductor heated at one end; and then describes a second easily applied method which makes use of a heat-discharge body; results of investigation of number of insulating materials and systems.

Protection Against Moisture. The Protection of Insulation Against Moisture, C. H. Herter. Refrig. World, vol. 62, no. 3, Mar. 1927, pp. 7–10 and 32. Methods used in safeguarding cold-storage insulation against entrance of moisture.

INSULATING MATERIALS, HEAT

Heat-Loss Measurement. Improved Apparatus for Measuring Thermal Conductivity, A. L. Spafford. Ice & Rrefrigeration, vol 72, no. 2, Feb. 1927, pp. 176–177, 2 figs. Improved instrument designed by J. C. Peebles for measuring heat loss through insulating tests made and manner of procedure.

INTERNAL-COMBUSTION ENGINES

Air Cleaners. Selecting an Air-Cleaner, A. H. Hoffman. Soc. Automotive Engrs.—Jl., vol. 20, no. 3, Mar. 1927, pp. 393–396. Importance of high efficiency and low restriction is emphasized and requirements to be considered in order to obtain satisfactory operation are enumerated; characteristics of various types of air cleaner, including plain dry type, plain oily type, both self-washing and not self-washing, inertia type, most of which are of dry centrifugal type, and water type.

Detonation. Gaseous Explosions, G. G. Brown and G. B. Watkins. Ind. & Eng. Chem., vol. 19, no. 3, Mar. 1927, pp. 363–369. Rate of rise of pressure, velocity of flame travel and detonation wave; probable mechanism causing "detonation" in internal-combustion engine.

Freeing Piston Rings. Freeing Carbonized Piston Rings, A. B. Newell. Power, vol. 65, no. 11, Mar. 15, 1927, p. 405. Saving rings; boiling in lye water; pulling exhaust valves while engine is hot; carbon is not only trouble maker.

Fuel-Flame Spectroscopy. Ultraviolet Spectroscopy of Engine-Fuel Flames, G. L. Clark and A. L. Henne. Soc. Automotive Engrs.—Jl., vol. 20, no. 2, Feb. 1927, pp. 264–269, 2 figs. Method of control of engine so that quantitative and reproducible measurements of detonation and comparisons with spectra can be made.

Testing. New Engine-Testing Forms. Soc. Automotive Engrs.—Jl., vol. 20, no. 1, Jan. 1927, pp. 10–12. Proposed S.A.E. standard charts will be applicable to all internal-combustion-engine types.

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; GAS ENGINES; OIL ENGINES.]

IRON ALLOYS

Iron-Chromium-Nickel. An Introduction to the Iron-Chromium-Nickel Alloys, E. C. Bain and W. E. Griffiths. Am. Inst. Min. & Met. Engrs.—Trans., no. 1650-C, Mar. 1927, 46 pp., 37 figs. Results of inquiry into structural nature of some 70 iron alloys containing both nickel and chromium over considerable range of concentration; above 1000 deg. cent. entire iron-chromium-nickel system is probably composed of only two kinds of solid solutions; one is austenite containing some chromium and other is ferrite containing some nickel; ferrite phase increases in composition range with rise in temperature above 1050 deg.; many of alloys containing from 5 to 10 per cent each of nickel and chromium are martensitic when quenched from great variety of temperatures and at great variety of rates.

IRON CASTINGS

Oil-Sand Application. Oil Sand and Motor Castings, W. West and W. Aston. Foundry Trade Jl., vol. 35, no. 547, Feb. 10, 1927, pp. 125–130, 12 figs. Methods employed for manufacture of cylinders and other castings in use at Leyland Works.

IRON, PIG

Foundry. Need for Research in Foundry Pig-Iron, R. Moldenke. Am. Inst. Min. & Met. Engrs.—Trans., no. 1648-C, for mtg. Feb. 1927, 5 pp. Conditions under which pig iron is melted; trend today is toward specification of total carbon content in pig iron; it seems that time has come for technical side of furnace development of country to be organized into associated effort, so that this industry may benefit in similar manner as has that of foundry.

L

LATHES

Multiple Tool. A New Multiple Tool Lathe. Automobile Engr., vol. 17, no. 225, Feb. 1927, pp. 68–69, 2 figs. Constructional details of compact semi-automatic machine developed by Drummong Bros., Ltd., Guildford.

Automatic Multi-Cut Lathe. Machy. (Lond.), vol. 29, no. 749, Feb. 17, 1927, pp. 649–650, 3 figs. Made by Gebr. Heinemann A.G., St. Georgen; it is intended to use on both repetition work and small batches.

LIGHTING

Drafting Rooms. Drawing-Office Lighting. Engineer, vol. 143, no. 3711, Feb. 25, 1927, pp. 205–206, 2 figs. By reason of important and special nature of work carried out in drafting rooms, illumination of character entirely different from that employed in commercial offices is required; general requirements are: (1) elimination of all shadow effects from drawing boards, (2) intensity of illumination over working plane must be sufficient for accurate detail work, (3) adequate light diffusion must be obtained with wide and uniform distribution, (4) glare must be non-existent, (5) moderate installation cost.

Landing Fields. Airplane Landing Field Lighting, O. Werner. Aviation, vol. 22, no. 9, Feb. 28, 1927, pp. 410–412, 4 figs. Specialized equipment developed for air ways.

LIGNITE

Southwestern States. Low-Grade Coals and Lignite for Fuel, C. W. Dabney. Mfrs. Rec., vol. 91, no. 11, Mar. 17, 1927, pp. 77–78. Brings out points in connection with uses that are being made of low-grade coal and lignites as fuel, which opens up vast industrial possibilities for Southwest.

LIQUIDS

Boiling Point and Pressure. Boiling Points and Vapor Pressures, E. N. Jonson. Gas Age-Rec., vol. 59, no. 8, Feb. 19, 1927, pp. 259–360, 6 figs. Since there exists definite relationship between boiling point and pressure upon liquid, for any liquid, curves or tables can be arranged so that characteristics of liquid can be readily observed; such curves would be highly useful in regulating operation, determining most practical distillation temperature and pressure under given operating limits, as well as, in distillation of certain mixtures, what products might be expected.

LOCOMOTIVES

Atlantic Type. The Atlantic or 4-4-2 Type Locomotive, A. Curran. Ry. & Locomotive Eng., vol. 40, no. 2, Feb. 1927, pp. 41–42, 2 figs. In point of size and weight, some examples of 4-4-2 type are equal to certain classes of power which have many years of usefulness ahead of them; but in tractive power and general availability few Atlantics are suitable for modern service; express trains are too heavy for them and local trains require engines capable of quicker acceleration and all-round liveliness.

Boosters. Economic Advantages of the Roller Bearing and Locomotive Booster, W. E. Symons. Ry. & Locomotive Eng., vol. 40, no. 2, Feb. 1927, pp. 36–37, 1 fig. Presents graphic chart which shows hypothetical case of division of time of heavy local passenger train in making regular station stops in order to emphasize value of auxiliary engine, or booster; and also use of roller bearings.

Coaling Stations. Reading Builds Unusual Coaling Station at Rutherford, Pa. Ry. Age, vol. 82, no. 7, Feb. 12, 1927, pp. 456–458, 4 figs. Mixing and measuring devices permit use of more economical fuel and measurement of all withdrawals.

Electric. See ELECTRIC LOCOMOTIVES.

Fireless. Steam Generation in Hot-Water Ac-

cumulator by Pressure Reduction, Especially in the Case of Fireless Locomotives (Die Dampferzeugung im Heisswasserspeicher durch Drucksenkung insbesondere bei feuerlosen Lokomotiven), Wichtendahl. Archiv für Wärmewirtschaft, vol. 8, no. 1, Jan. 1927, pp. 13–17, 11 figs. Critical discussion of well-known formulas of steam generation in hot-water accumulator; derivation of new equation taking into consideration moisture of steam and cooling loss.

High-Pressure. The Locomotive "John B. Jervis." Ry. & Locomotive Eng., vol. 40, no. 2, Feb. 1927, pp. 33–35, 2 figs. Improved high-pressure locomotive is put in service on Delaware & Hudson.

Hudson-Type. First Hudson Type Locomotive. Ry. Age, vol. 82, no. 8, Feb. 19, 1927, pp. 523–526, 3 figs. New York Central receives 4-6-4 heavy passenger engine from American Locomotive Co.

Steam-Turbine. The Reid-MacLeod Steam Turbine Locomotive. Engineer, vol. 143, no. 3708, Feb. 4, 1927, pp. 118–120, 12 figs. partly on p. 130 and supp. plate. In this British design, problem has been attacked in different way from that followed by other makers; arrangement consists of long girder frame on which boiler, condenser, etc., are mounted, and which is borne by two 8-wheeled trucks, on one of which is fitted high-pressure steam turbine and on other a low-pressure turbine; each of these turbines drives through reducing gear a short longitudinal countershaft, which is provided at each end with bevel pinion gearing with large bevel wheel on quill which drives axle passing through it.

LUBRICATING OILS

Viscosity and Adhesion. Theoretical and Practical Study of Lubrication (Etude théorique et pratique sure le graissage), H. Havre. Génie Civil, vol. 90, no. 2, Jan. 8, 1927, pp. 45–48, 9 figs. It is shown that lubricating value of oil is primarily function of its adhesiveness, which is result of electrostatic and chemical phenomena combined with phenomena of absorption; viscous oil of low adhesive quality is poor lubricant, whereas oil of low viscosity but with great adhesive capacity is excellent lubricant.

LUBRICATION

Cold-Weather Requirements. Cold Weather Requirements as Pertaining to Lubrication, A. F. Brewer. Indus. Mgmt. (N. Y.), vol. 73, no. 2, Feb. 1927, pp. 101–105, 7 figs. Deals with lubrication of mechanical equipment in severe service or under extremely bad weather conditions; explains properties of different kinds of lubricants; points out effect of proper lubrication and its results, tending to reduce undue wear and possible mechanical delays or failures.

M

MACHINE SHOPS

Production Costs. Lower Costs Asked of the Foreman, A. Mumper. Iron Age, vol. 119, no. 10, Mar. 10, 1927, pp. 713–715. Stumbling blocks to cheaper production; study in quantity output at low cost per unit

MACHINE TOOLS

Automobile Industry. Machine Tools for Automobile Manufacture (Werkzeugmaschinen für den Kraftfahrzeugbau), E. Fischer. Motorwagen, vol. 30, no. 3, Jan. 31, 1927, pp. 57–61, 11 figs. Improvements in milling machines, grinding machines, crankshaft lathes, drilling machines, etc.

Charts for Operation. Graphic Presentation of Equation for Economical Operation of Machine Tools (Die graphische Darstellung von Gleichungen, die für die wirtschaftliche Ausnutzung vorhandener Werkzeugmaschinen Verwendung finden können), F. H. Huth. Maschinen-Konstrukteur, vol. 60, no. 1, Jan. 15, 1927, pp. 4–6, 3 figs. Presents cutting-speed diagram, cutting-resistance curve, production-speed cruve, etc., and describes their practical application.

Failures. Machine-Tool Failures—Their Causes and Avoidance, E. R. Stoddard. Soc. Automotive Engrs.—Jl., vol. 20, no. 3, Mar. 1927, pp. 385–388. Investigation of causes of machine-tool failures in plants of Studebaker Corp. of America at South Bend showed them to be due to three major causes which, in order of their importance, are (1) lack of lubrication, (2) overloading machines and carelessness, and (3) poor design and construction of machine-tools; author recommends specific measures that would greatly reduce number of failures.

Replacement Policy. What Are the Reasons for Replacing Obsolete Equipment? Am. Mach., vol. 66, nos. 2, 4, 6, 8, Jan. 13, 27, Feb. 10 and 24, 1927, pp. 39–40, 157–158, 239–240 and 316–317. Jan. 13: Value of repair cost record. Jan. 27: How obsolete machines are disposed of. Feb. 10: Faults of machine tools. Feb. 24: How to keep informed of developments in equipment.

MACHINING METHODS

Instrument Manufacture. Quantity-Production in Manufacture of Apparatus and Instruments (Fertigungsarten der Massenherstellung in der Feinmechanik) E. Dinse. V.D.I. Zeit., vol. 71, no. 4, Jan. 22, 1927, pp. 127–130, 46 figs. Deals with cutting, punching, bending, planing, etc., of materials.

MAGNESIUM ALLOYS

Analysis. Methods of Analyzing Industrial Alloys of Magnesium (Méthodes d'analyse des alliages industriels de magnésium), E. Pretet and L. Ecoffet. Chimie & Industrie, vol. 16, no. 3, Sept. 1926, pp. 459–470, 2 figs. Determination of silicon, iron, aluminum, copper, zinc, manganese, lead, cadmium, nickel, calcium, carbon, nitrogen, etc., in magnesium and magnesium alloys.

MANGANESE STEEL

Properties. Curious and Hitherto Unexplained Facts Concerning Manganese Steel (Quelques faits curieux et non encore expliqués observés dans l'acier au manganèse), R. Hadfield. Chimie & Industrie, vol. 16, no. 3, Sept. 1926, pp. 136–139, 4 figs. Properties of manganese steel; effects of heat treatment on hardness and magnetic properties; photomicrographic examination.

MATERIALS HANDLING

Industrial Plants. Better Methods Cut Handling Costs 50%, E. L. Spray. Mfg. Industries, vol. 13, no. 2, Feb. 1927, pp. 101–106, 13 figs. Westinghouse plant also reduces direct labor costs 20 per cent by new equipment and rearrangement of layout.

The Trackless Industrial Plant, M. G. Farrell. Indus. Mgmt. (N. Y.), vol. 73, no. 3, Mar. 1927, pp. 135–140, 5 figs. Ways and means of securing greater flexibility in production layout; storage and handling of bulk material; unloading and storage methods; use of lift trucks; use of ramp in factories; comparative costs of ramps and elevators.

MEASURING INSTRUMENTS

Comparators. Société Genevoise Comparator for Small Internal Diameters. Am. Mach., vol. 66, no. 9, Mar. 3, 1927, pp. 389–390, 1 fig. Made by Société Genevoise d'Instruments de Physique of Geneva, Switzerland, for use in measuring internal diameters of small size.

METAL SPRAYING

Processes. Metal Spraying, W. E. Ballard. Metal Industry (Lond.), vol. 30, no. 7, Feb. 18, 1927, pp. 191–192. Schoop process; early failures due to porosity; preparation of surface; sprayed zinc; aluminum coatings; lead and tin. Lecture before Birmingham Assn. Mech. Engrs.

METAL WORKING

Winding Strip Stock. Edgewise Winding of Metal Strip, H. A. Freeman. Machy. (N. Y.), vol. 33, no. 7, Mar. 1927, pp. 525–528, 8 figs. Points out that metal washers and gaskets of large size and various shapes can often be produced at considerable saving in stock and tool-equipment costs by winding strip stock edgewise into coil of shape desired and then sawing through coil lengthwise; methods described are quite simple and yet turn out work of satisfactory quality at good production rate.

METALS

Corrosion. Controllable Variables in the Quantitative Study of the Submerged Corrosion of Metals, O. B. J. Fraser, D. E. Ackerman and J. W. Sands. Ind. & Eng. Chem., vol. 19, no. 3, Mar. 1927, pp. 332–338, 9 figs. Great influence of controllable variables on results of laboratory corrosion tests of total-immersion type is discussed and illustrated by numerous data obtained in study of action of sulphuric-acid solutions on monel metal.

Elastic Properties. Study of Elastic Properties and Viscosity of Metals and Alloys (Contribution a l'étude des propriétés élastiques et de la viscosité des métaux et alliages), P. Chevenard and A. Portevin. Chimie & Industrie, vol. 16, no. 3, Sept. 1926, pp. 434–448, 35 figs. Methods and apparatus for study of elasticity; modulus of elasticity and internal friction as function of initial state and of testing temperature; influence of quenching; study of viscosity of alloys.

Plasticity and Recrystallization. Plasticity, Strain Hardness and Recrystallization (Ueber Plastizität, Verfestigung und Rekristallisation), R. Becker. Zeit. für technische Physik, vol. 7, no. 11, 1926, pp. 547–555, 2 figs. Structure of deformed material is conceived as intermediate stadium between single crystal and fully amorphous subcooled liquid; this interpretation offers explanation of recrystallization diagram, of change of density with deformation, and of occurrence of place changing and consequent "amorphous plasticity."

Tensile Tests. Tensile Tests of Flat Tensile Bars (Der Zugversuch am Flachstab), W. Kuntze and G. Sachs. Stahl u. Eisen, vol. 47, no. 6, Feb. 10, 1927, pp. 219–226, 14 figs. Influence of expansion and shrinkage; relation of cross-section of stress and deformation; expansion and shrinkage in copper or similar metals, and in iron.

METHANOL

Water Gas as Source. Use of Off-Peak Water-Gas Capacity for Methanol Production, A. C. Fieldner. Am. Gas Jl., vol. 126, no. 8, Feb. 19, 1927, pp. 179–181 and 18. Description and present status of process.

MILLING MACHINES

Cam. Hydraulically-Operated Cam Milling Machine. Machy. (Lond.), vol. 29, no. 745, Jan. 20, 1927, p. 519, 3 figs. New type semi-automatic cam-milling machine by Lidköpings Mek, Verkstad, Lidköping, Sweden, embodying hydraulic features and designed for accurate finishing of face and box cams for Diesel, motor, and other cam-operated engines, also for heart-shape and automatic machine cams.

Plano. Profile Milling on a K & G Patent Plano Milling Machine. British Machine Tool Eng., vol. 4, no. 43, Jan.-Feb. 1927, pp. 542–544, 1 fig. New machine specially adapted for machining irregular shaped work.

Standard Spindle End. Milling-Machine Manufacturers Announce Standardized Spindle End. Mech. Eng., vol. 49, no. 4, Apr. 1927, p. 380, 1 fig. Standard spindle end and arbor as evolved by Committee of Machine Tool Builders' Assn. has taper of $3^1/_2$ in. per foot; driving is accomplished by tongues or blocks set in face of spindle engaging in slots in plate on arbor; draw-in bolt of large diameter binds arbor firmly in place.

MOLDING MACHINES

Jarring. Large Jarring Machines (Grossrüttler), U. Lohse. V.D.I. Zeit., vol. 71, no. 4, Jan. 22, 1927, pp. 109–114, 22 figs. Describes jarring process; filling equipment; design and operation of different jarring machines of German make, in which shaken mold and pattern are mechanically separated.

MOLDING METHODS

Hollow Cylinders. How to Make a Mold for a Long Hollow Cylinder. Foundry, vol. 55, no. 5, Mar. 1, 1927, pp. 174–176, 2 figs. Several alternative methods suggested; local conditions affect final choice; loam and dry sand compared as molding medium.

Hydraulic-Turbine Blades. The Molding of Francis-Turbine Blades (Das Einformen von Francisturbinen-Rädern), K. Grün. Maschinen-Konstrukteur, vol. 60, no. 3, Feb. 15, 1927, pp. 60–62, 6 figs. Describes method of molding blades with cast-in sheet-steel blades without use of special cores.

MOLDS

Drying. Dries Molds Electrically, F. C. Taylor. Foundry, vol. 55, no. 5, Mar. 1, 1927, pp. 167–168, 2 figs. Results of investigation conducted by Gleason Works, Rochester, N. Y., to determine best method for drying molds; company found electricity exceedingly satisfactory for this purpose.

New Gas-Burner Designs and Gas-Furnace Equipment (Neue Gasbrennerkonstruktionen und Gasfeuerungseinrichtungen), E. Meier. Giesserei, vol. 14, no. 5, Jan. 29, 1927, pp. 71–73, 6 figs. Describes new type of gas burner and furnace equipment for drying of cores and molds and for heating foundry ladles and drying ovens in iron and steel foundries.

Flaskless. Flaskless Molds (Kastenlose Formen), U. Lohse. Giesserei, vol. 14, no. 6, Feb. 5, 1927, pp. 81–83, 9 figs. Results heretofore obtained; disadvantages of usual sand-block molds; snap flasks; flasks with movable parts, having removable sand edges; method of utilizing them for making molds; standard dimensions.

Testing. Testing of Molding Material and Molds (Formstoff- und Formenprüfung), L. Treuheit. Stahl u. Eisen, vol. 47, nos. 4 and 8, Jan. 27 and Feb. 24, 1927, pp. 121–128 and 298–302, 16 figs. Influence and determination of work of ramming; relation between ramming strength, binding capacity, gas permeability, moisture and clay content; chemical and physical properties of related mold materials and mixtures; results of tests.

MOTOR BUSES

Associated Daimler Co. New A.D.C. Passenger Chassis. Motor Transport, vol. 44, no. 1144, Feb. 14, 1927, pp. 175–177, 6 figs. Two 4- and two 6-cylinder low-framed chassis for coach and single-deck omnibus work.

Berlin. The Bus in Germany. Motor Transport, vol. 44, no. 1147, Mar. 7, 1927, pp. 287–289, 4 figs. Particulars of General Berlin Omnibus Co.'s vehicles: Berlin and London passengers contrasted; light metal components; German view of 6-wheel omnibuses; 4 vs. 6-cylinder engines.

Paris. The New Motor Buses of Paris (Les nouveaux autobus de Paris), P. Bourguignon. Industrie des Voies Ferrées et des Transports Automobiles, vol. 21, no. 241, Jan. 1927, pp. 16–22, 12 figs. Chief change from older design consists in lowering body; engine is monobloc 4-cylinder type.

MOTOR TRUCKS

Producer-Gas. Producer-Gas Trucks (Les camions a Gazogène), G. Delanghe. Génie Civil, vol. 90, no. 1, Jan. 1, 1927, pp. 1–13, 29 figs. Considerations and descriptions of principal French types. Technical point of view: process of cleaning gas; operation of trucks. Economic viewpoint; calculation of economy to be derived by replacing alcohol with producer gas.

Fuels for Producer-Gas Trucks (Combustibles à employer sur les camions à gazogène), P. Dumanois. Société d'Encouragement pour l'Industrie Nationale—Bul., vol. 125, no. 12, Dec. 1926, pp. 912–913. Best results on Berliet trucks were obtained with producers fed by air-dried oak without bark, containing about 20 per cent of moisture; experience shows that it is unwise to employ producer gas in engines built for gasoline and advocates use of special motors with increased bore and compression; fact is brought out that for given tonnage of wood about three times as much mechanical energy can be produced with wood itself as fuel as with same wood previously burned to charcoal. See brief translated abstract in Mech. Eng., vol. 49, no. 4, Apr. 1927, p. 366.

O

OIL ENGINES

Light-Weight. Light-Weight Oil Engines, F. Johnstone-Taylor. Gas & Oil Power, vol. 22, no. 258, Mar. 3, 1927, pp. 119–121, 5 figs. European and American progress in design.

Small 4-Cycle. Ten Hp. Per Cylinder in New Four-Cycle Design. Oil Engine Power, vol. 5, no. 3, Mar. 1927, p. 170, 2 figs. Atlas-Imperial Engine Co. announce what is probably smallest 4-cycle high-compression cold-starting engine on American market.

OIL FUEL

Burners. Laidlaw and Drew Oil Fuel Burners. Engineering, vol. 123, no. 3186, Feb. 4, 1927, pp. 151–153, 11 figs. These burners are outcome of long series

of trials and experiments made in connection with production of internal-combustion boiler, for which it was necessary to design burner capable of giving flame that would burn in enclosed space under considerable pressure; means for controlling shape of flame produced were devised.

The Filma System. Machy. Market, no. 1371, Feb. 11, 1927, pp. 25-26, 7 figs. Success of these burners is due in great measure to complete atomization of thin film of oil by steam or compressed air; large turbulent flame is produced which causes uniform temperature to be maintained throughout whole of furnace or combustion chamber.

Central States. Fuel Oil Situation in the Central States, C. Osborn. Power, vol. 65, no. 10, Mar. 8, 1927, pp. 358-359, 1 fig. Study made for purpose of measuring changes and, on basis of data available, of roughly gaging future trend of supply, uses and prices of fuel oil, with particular reference to central part of United States.

OPEN-HEARTH FURNACES

Developments. Developments in the Open Hearth Process, B. M. Larsen. Forging—Stamping—Heat Treating, vol. 12, no. 2, Feb. 1927, pp. 55-60. Review of furnace construction and operation; metallurgical practices; temperature measurement and control; waste-heat boilers; insulation; refractories; pig iron for open hearth; gas oxidation; bibliography.

End Ports. Open-Hearth End Ports, B. Finney. Iron Age, vol. 119, no. 10, Mar. 10, 1927, p. 715, 2 figs. By deviation from standard practice in construction, basic open-hearth steel furnace at Lima, O., plant has been enabled to produce four 25-ton heats in 24 hr.; this oil-burning furnace has three instead of customary two uptakes.

Recuperators. Recuperators for the Open-Hearth, W. H. Fitch. Iron Age, vol. 119, no. 13, Mar. 31, 1927, pp. 920-922, 3 figs. Suggestion for recovering part of waste heat now going up stacks; less fuel and more steel claimed possible; carborundum used in construction.

Steel-Melting. Small Open Hearth Furnace of New Design, H. G. Begeman. Fuels and Furnaces, vol. 5, no. 2, Feb. 1927, p. 242, 2 figs. Furnace for melting steel, with gas producers built on to both heads of furnace, has recently been developed and placed in operation in steel plant in Austria; hearth of furnace is connected with high-temperature zone of producers, so that radiant heat of this zone acts directly upon hearth space and increases its temperature.

OXYACETYLENE WELDING

Pipe Lines. Pipe Line Welding from the Oxy-Acetylene Viewpoint, L. Edwards. Am. Welding Soc.—Jl., vol. 6, no. 2, Feb. 1927, pp. 7-24, 18 figs. Advantages; notes on preparation, material, aligning of pipe, methods of laying pipe, testing of line, expansion and contraction, etc.

Steel Plate. Oxy-Acetylene Welding Steel Plate, T. C. Fetherston. Am. Welding Soc.—Jl., vol. 6, no. 2, Feb. 1927, pp. 25-30, 4 figs. Two major factors of importance are fusion and penetration; former indicates thorough mixing of molten metal from sides of joint and from welding rod, and latter indicates careful welding of pieces to be joined entire way to bottom of space between edges.

P

PATENTS

German Procedure. German Patent Procedure, O. Munk. Am. Mach., vol. 66, no. 10, Mar. 10, 1927, pp. 397-398. Filing of German patent application entails substantially same steps as in United States; grounds for opposition; regulations covering licenses.

PLANERS

Electric Drive. A Large Electrically-Driven Planing Machine. Engineer, vol. 143, no. 3710, Feb. 18, 1927, pp. 190-193, 6 figs. Made by J. Stirk & Sons, Halifax; weighs 75 tons and can plane faces of block 10 ft. wide, 8 ft. high, and 20 ft. long.

PRODUCER GAS

Detarring. The Electrical Detarring of Lignite Producer Gas (Die elektrische Entteerung des Braunkohlen-Generatorgases), O. Beckmann. Sprechsaal, vol. 59, no. 48, Dec. 2, 1926, pp. 807-808, 2 figs. Results of tests making use of Cottrell-Möller process for precipitation of producer and distillation gases.

PULVERIZED COAL

Boiler Firing. Experience with Pulverized-Coal Firing of Boilers (Erfahrungen mit Steinkohlenstaubfeuerungen an Dampfkesseln), F. Schulte. Archiv für Wärmewirtschaft, vol. 8, no. 1, Jan. 1927, pp. 3-8, 7 figs. Types of burners: flat burners have proved better than round burners, assuring better mixture of air and fuel; influence of cooling surfaces; refractory bricks; care and supervision; pulverized-coal auxiliary firing.

Fineness. Investigations on the Measurement of Fineness of Pulverized Coal by Hand Sifting (Untersuchungen über die Messung der Kohlenstaubfeinheit durch Handsiebung), E. Rammler. Archiv für Wärmewirtschaft, vol. 8, no. 1, Jan. 1927, pp. 18-22, 2 figs. Details of sifting process; influence of sifted material and screen mesh on accuracy of analysis; recommendations for sifting method.

Measurement of fineness of Pulverized Coal by Mechanical Sifting (Messung der Kohlenstaubfeinheit durch maschinelle Siebung), Förderreuther. Archiv für Wärmewirtschaft, vol. 8, no. 2, Feb. 1927, pp. 51-56, 9 figs. Sifting process and influence of defects in screen mesh; tests on sifting machines already on market and of newly designed machine; practical experience.

Pulverizers. A Coal Pulverizing Machine. Engineer, vol. 143, no. 3712, Mar. 4, 1927, p. 249, 2 figs. Machine comprises series of beater arms hinged to disks on rapidly rotating shaft; interior of casing in which beaters rotate is in parts, formed of serrated cast-steel segments, and coal, fed in at top, is thrown violently against these serrations by action of beaters and is thoroughly pulverized.

Improvements in the "Atritor" Coal Pulverizer. Mech. World, vol. 81, no. 2095, Feb. 25, 1927, p. 142, 1 fig. Account of various modifications; important improvement is adoption of stronger and stiffer shaft; feeder drive has been redesigned, roller chain being substituted for vee belt.

Rhenish-Westphalian Coal for. Rhenish-Westphalian Coal for Pulverized-Coal Firing (Rheinisch-westfälische Steinkohlenarten in der Staubfeuerung), W. Schulte. Archiv für Wärmewirtschaft, vol. 8, no. 2, Feb. 1927, pp. 41-48, 3 figs. Determination of ignition point of different varieties of pulverized coal with different grain sizes; influence of moisture content, fineness, volatile constituents, and ignition; investigations of combustion process; influence of air, admission and distribution.

PUMPS

Oscillating-Piston. The Corma Oscillating-Piston Pump. Engineering, vol. 123, no. 3184, Jan. 21, 1927, pp. 74-75, 7 figs. New pump which is essentially of reciprocating type, but possesses advantages over normal plunger pump that it is more compact and has rotary drive, has been put on market by Belgium concern.

PUMPS, CENTRIFUGAL

Self-Starting. New Types of Self-Starting Centrifugal Pumps, F. Neumann. Eng. Progress, vol. 8, no. 2, Feb. 1927, pp. 47-50, 11 figs. Requirements to be fulfilled by centrifugal pumps; modern types; fire pumps; saving in space and weight as compared with piston pumps.

R

RAILWAY MOTOR CARS

Gasoline-Electric. Double Power Plant Motor Cars on the Lehigh Valley. Ry. Mech. Engr., vol. 101, no. 2, Feb. 1927, pp. 89-92, 6 figs. Four Brill 500-hp. units handle maximum trains of over 300 tons in local service; each motor car carries two power plants, each consisting of 250-hp. Brill-Westinghouse gasoline engine direct connected to Westinghouse 160-kw. generator.

Two Gas-Electric Cars Put in Service on D. T. & I. Ry. Age, vol. 82, no. 9, Feb. 26, 1927, pp. 563-564, 5 figs. Each car displaces passenger train making daily run of 280 mi. in regular service.

RAILWAY OPERATION

Economics. Report of Committee XXI—Economics of Railway Operation. Am. Ry. Eng. Assn.—Bul., vol. 28, no. 293, Jan. 1927, pp. 471-556, 13 figs. Methods of analyzing costs for solution of special problems; methods of operation by which intensive use of facilities may be secured; development of suitable units for costs of operation and equipment maintenance; study of problem of branch-line operation as affected by introduction of motor trucks and bus lines.

RAILWAY REPAIR SHOPS

Handling Devices. Handling Devices of the Southern Pacific, L. C. Morrow. Am. Mach., vol. 66, no. 9, Mar. 3, 1927, pp. 371-372, 4 figs. By making use of scrap and other parts that are to be found in any back shop, Southern Pacific has constructed devices that have greatly reduced time required for handling flues, superheater units and other parts.

Locomotive. Meeting Repair Demands in the G. C. & S. F. Shops in Cleburne, F. W. Curtis. Am. Mach., vol. 66, no. 8, Feb. 24, 1927, pp. 319-321, 7 figs. Construction of blacksmith and boiler shop to facilitate repairs of motive power; miscellaneous operations and tools in machine shop; equipment for handling flues.

RAILWAY SIGNALING

Color-Light Signals. C. B. & Q. Tests Primary Batteries and A-C. Primary on Light Signals. Ry. Signaling, vol. 20, no. 3, Mar. 1927, pp. 90-92, 6 figs. Lebby mirror reflectors with five-watt lamps controlled by approach circuits result in long battery life on 26 mi. of single-track line circuits in cable.

Color-Position-Light. A-C. Floating Color-Position-Light Signals on 132 Miles of Baltimore & Ohio, F. P. Patenall. Ry. Signaling, vol. 20, no. 3, Mar. 1927, pp. 87-89, 14 figs. Signals increase track capacity and promote safety; design and development of color-position-light signal system.

Interlocking. Maintenance of Interlocking in the Grand Central Terminal, F. E. Wass. Ry. Signaling, vol. 20, no. 3, Mar. 1927, pp. 106-109, 7 figs. Extensive layout, all underground, involves special problems to eliminate delay on account of heavy traffic.

Simple Interlocking Eliminates Train Stops in City Streets, L. Wyant. Ry. Age, vol. 82, no. 8, Feb. 19, 1927, pp. 527-529, 5 figs. Unique installation at Cedar Rapids, Iowa, solves serious traffic problem and facilitates rail movements at minimum cost.

RAILWAY SWITCHES

Spring. Spring Switches Used Extensively on Chicago & North Western, J. A. Peabody Ry. Signaling, vol. 20, no. 3, Mar. 1927, pp. 97-101, 14 figs. Also Ry. Age, vol. 82, no. 10, Mar. 5, 1927, pp. 639-642, 10 figs., 17 installations on 8 different kinds of layout with special signal protection, latest-type buffers and rods used.

RAILWAY TIES

Preservative Treating. Substantial Economies Obtained by Use of Treated Timber, C. A. Smith. Elec. Ry. Jl., vol. 69, no. 11, Mar. 12, 1927, pp. 455-457, 8 figs. Georgia Ry. & Power Co. has reduced cost of ties by $1188 per year per mile of track; prior to installation, all timber receives preservative treatment by Rueping process.

Specifications. Railroad Tie Specification and Tie Treatment, W. F. Goltra. Eng. News-Rec., vol. 98, no. 8, Feb. 24, 1927, pp. 309-310, 1 fig. New classification of ties by size and area is proposed; needless to group ties by species for treatment.

Report of Committee III—Ties. Am. Ry. Eng. Assn.—Bul., vol. 28, no. 292, Dec. 1926, pp. 189-206, 4 figs. Recommendations for future work; substitute ties—reports from railways making tests; anti-splitting devices; renewal of switch ties out of face versus individually.

RAILWAY TRACK

Concrete Roadbed. Building Concrete Roadbed for the Pere Marquette R. R. Eng. News-Rec., vol. 98, no. 8, Feb. 24, 1927, pp. 312-313, 4 figs. Heavy slab has steel truss reinforcement under rails; gravel concrete mix; construction methods.

Economics. Economics of Railway Track, J. M. Farrin. Am. Ry. Eng. Assn.—Bul., vol. 28, no. 291, Nov. 1926, pp. 177-187, 14 figs. With view of determining as accurately as possible how railway track is affected when rail, ties or ballast are changed, study was made of these component parts and diagrams constructed showing how track as a whole is affected by changing any of its makeup parts; deals only with that part of track above subgrade.

Grade Crossing. Report of Committee IX—Grade Crossing Design, Protection and Elimination. Am. Ry. Assn.—Bul., vol. 28, no. 292, Dec. 1926, pp. 247-281. Recommendations for future work; methods of apportioning cost of highway improvements adjacent and parallel to railroad rights-of-way.

Specifications. Report of Committee V—Track. Am. Ry. Eng. Assn.—Bul., vol. 28, no. 292, Dec. 1926, pp. 177-188, 13 figs. Revision of manual; plans of switches, frogs, crossings and slip switches; specifications and designs for foundations under crossings.

RAILWAY YARDS

Classification. System Classification Plan Improves Yard Efficiency, H. R. Fertig. Ry. Age, vol. 82, no. 8, Feb. 19, 1927, pp. 515-522, 14 figs. Installation of "maintracker" method on Rock Island results in large savings.

Yard Equipped With Car Retarders Classifies 2000 Cars a Day. Ry. Age, vol. 82, no. 9, Feb. 26, 1927, pp. 569-572, 7 figs. Indiana Harbor belt rebuilds restricted layout resulting in efficient operation under all weather conditions.

RAYON

Weaving. The Weaving of Artificial Silk, A. L. Wykes. Textile Inst.—Jl., vol. 18, no. 2, Feb. 1927, pp. P17-P19. Effect of tension on elastic limit; effect of wetting strained yarn; effect of friction; weaving and winding.

REDUCTION GEARS

Design. Notes on Reduction Gear, W. J. Guthrie. Inst. Mar. Engrs.—Trans., vol. 38, Jan. 1927, pp. 415-440 and (discussion) 441-463, 19 figs. Deals with mechanical or toothed gearing; gearing efficiencies and design; factors influencing smooth running without noise; lubrication; gear cutting; pitting and fracture of teeth; metallurgical problems; specification of gear pinions.

REFRIGERATING MACHINES

Absorption. Investigation of Sulphuric-Acid Absorption Refrigerating Machines (Untersuchung einer Schwefelsäure-Absorptionskältemaschine), E. Schneider. Zeit. für die gesamte Kälte-Industrie, vol. 34, no. 1, Jan. 1927, pp. 7-13, 7 figs. Details of machine built by Thüringer Eismaschinen A.G. in Gera, and its use as household machine, especially in the Tropics.

Carbon-Dioxide. CO_2 Liquid Pre-Cooling, E. H. Lamb. Ice & Cold Storage, vol. 30, nos. 347 and 348, Feb. and Mar. 1927, pp. 35-37 and 59-62, 12 figs. Examines first from purely theoretical standpoint, economy and refrigeration output of ordinary, Windhausen, and Voorhees cycles when external conditions are same for each; and secondly, compares results of carefully conducted trials of carbonic-acid machine working on both ordinary cycle and Voorhees' cycle, to ascertain to what extent results predicted by purely theoretical considerations can be realized in practical working.

Improvement. Cost Reduction and Improvements in Small and Large Refrigerating Machines [Verbilligung und Verbesserung (Rationalisierung) im Klein- und Grosskältemaschinenbau], W. Gustav. Zeit. für die gesamte Kälte-Industrie, vol. 34, no. 1, Jan. 1927, pp. 1-7, 6 figs. Points out deficiencies in existing types of small machines; describes G. S. compressor cylinder which permits construction of multi-cylinder vertical refrigerating machines of any size which meet all requirements of ideal low-cost machine.

REFRIGERATING PLANTS

Performance Determination. Finding the Performance of an Ammonia Refrigerating Plant, A. T. Nicholas. Power, vol. 65, no. 10, Mar. 8, 1927, pp. 368-369, 3 figs. Use of temperature-entropy graph of ammonia cycle permits simple method of determining performance of unit if conditions of operation are known.

REGULATORS

Steam-Pressure. Steam Pressure Regulator for Heat-Extraction Engines. Engineering, vol. 123, no. 3184, Jan. 21, 1927, p. 76, 4 figs. on p. 78. Automatic regulator for maintaining constant steam pressure on extraction mains, whatever load on engines may be; they are attached to compound extraction engines, each of 600 i.hp.

ROLLING MILLS

Bar Mills. Mill to Roll Bars, Rods and Strip, F. L. Prentiss. Iron Age, vol. 119, no. 11, Mar. 17, 1927, pp. 779–783, 8 figs. Continuous sheet-bar mill run by 9000-hp. motor; flexibility is outstanding feature of new 10-in. merchant mill of Corrigan, McKinney Steel Co., Cleveland.

Cold Strip. Coilers for Cold Strip Rolling Mills, C. E. Davies. Engineer, vol. 143, nos. 3707 and 3708, Jan. 28 and Feb. 4, 1927, pp. 92–94 and 123–125, 21 figs. Primary purpose is merely to dispose conveniently of long strips of metal; hand coiling is only advantageous when dealing with very short strips; types of coilers; essential features of effective coiler of regular type; principle of automatic coiler; thick strip coilers.

Electrification. Electrification of Phoenix Mills (Pa.), R. H. Wright. Iron Age, vol. 119, no. 10, Mar. 10, 1927, pp. 710–712, 3 figs. All steam drives and steam lines eliminated; structural-mill capacity increased 25 per cent.

Ford Motor Co., River Rouge. The Steel Mill of the Ford Motor Company, T. Harvey. Gen. Elec. Rev., vol. 30, no. 3, Mar. 1927, pp. 152–159, 5 figs. Rolling mill; system of power generation and distribution; merchant and blooming-mill motors and control; projected developments and equipment.

S

SAND, MOLDING

Mechanical Handling. Steel Foundry Handles Sand Mechanically, B. Welser. Foundry, vol. 55, no. 4, Feb. 15, 1927, pp. 126–128, 5 figs. Wisconsin casting plant employs special installation to clean, cool, aerate and temper large quantities of molding sand.

SEAPLANES

Construction and Assembly. Construction and Assembly of Float and Boat Seaplanes, V. S. Gaunt. Roy. Aeronautical Soc.—Jl., vol. 31, no. 195, Mar. 1927, pp. 243–255, 6 figs. Deals with four main types of float seaplane, float design and construction, assembly, handling; and with two main types of boat seaplane, long-hull and short-hull types; metal construction.

Fokker. The Fokker Universal Seaplane. Aviation, vol. 22, no. 11, Mar. 14, 1926, p. 526, 1 fig. Well-known cabin monoplane proves highly successful in tests as seaplane; twin duralumin-construction pontoons employed.

German. German Seaplanes (Deutsche Seeflugzeuge), Langsdorff. Motorwagen, vol. 30, no. 2, Jan. 20, 1927, pp. 33–38, 12 figs. Details of seaplanes and flying boats participating in contest held at Warnemünde, July, 1926.

SHAFTS

Flexible. Strength and Elasticity of Flexible Shafts, T. M. Naylor. Machy. (Lond.), vol. 29, no. 750, Feb. 24, 1927, pp. 665–667, 5 figs. Results of tests carried out at Leeds University; object was to find safe twisting moment that shaft could withstand, and also to obtain total twist of shafts; various lengths of shafts were tested, and tests were made in both clockwise and anti-clockwise directions.

SILK

Spinning. Silk Thread Engineering, W. P. Seem. Textile World, vol. 71, nos. 8 and 11, Feb. 19 and Mar. 12, 1927, p. 37 and pp. 46–47, 2 figs. Feb. 19: Studies in first-time spinning consisting of discussions regarding spindle speeds and 6 factors upon which spinning efficiency depends; quality, strength, pliability and cohesion of silk all influence quality as well as quantity of production. Mar. 12: Four methods of determining spindle speed of spinning frame; effect of room temperatures and humidities on efficiency of spinners; use of bobbin boards and trays in handling silk after spinning.

SMOKE

Abatement. Chicago's Smoke Prevention Division, H. M. Bundesen and F. A. Chambers. Combustion, vol. 16, no. 2, Feb. 1927, pp. 96–99, 2 figs. Smoke problem confronting city of Chicago involves observation of chimneys of approximately 400,000 single and two-family dwellings and over 55,000 apartment buildings, power plants, locomotives, marine craft, and industrial furnace stacks, consuming over 30,000,000 tons of bituminous coal annually; Smoke-Abatement Division is provided with personnel consisting of combustion engineers, trained in burning of fuels and capable of giving instructions in proper methods of operation to secure smokeless results; instructions sometimes relate to methods of firing, and suggestions are made regarding kind of fuel used; observation work is further carried on through use of observation towers located at advantageous spots throughout city; supervision of equipment.

SOLDERING

Intercrystalline Penetration. The Penetration of Mild Steel by Brazing Solder and Other Metals, R. Genders. Engineering, vol. 123, no. 3192, Mar. 18, 1927, pp. 341–342, 8 figs. Results of preliminary observations which confirm theory that penetration of mild steel by brazing solder is of similar character as penetration in non-ferrous metals, such as mercury in brass and arsenical copper, solder in copper alloys and sodium in copper; suggests views on general subject of intercrystalline attack. Paper read before Inst. of Metals.

SOOT BLOWERS

Practice. Modern Soot-Blower Practice, R. June. Power, vol. 65, no. 9, Mar. 1, 1927, pp. 332–334, 5 figs. Marked changes in operating practice with respect to such important auxiliaries as mechanical soot blowers; steam economy improved; pressure-reducing orifices; continuous rotation saves steam; automatic stop; electrically driven blowers.

SPEED REDUCERS

Helical-Gear. Adds to Line of Helical Gear Speed Reducers. Iron Age, vol. 119, no. 11, Mar. 17, 1927, p. 790, 1 fig. R. D. Nuttall Co., Pittsburgh, Pa., has added new series designated as SVR, incorporating Company's $7\frac{1}{2}$-deg. helical gears and Timken taper roller bearings; advantages claimed for helical-type gears employed are that they drive with smoothness of worm and worm wheel, yet have high efficiency of spur or herringbone gear.

Industrial Machinery. Various Types of Speed Reducers for Industrial Machinery. Can. Min. Jl., vol. 47, no. 8, Feb. 25, 1927, pp. 160–161. Points out that open-gear drive has so many limitations as to safety, lubrication, cleanliness, space occupied, weight, etc., that it cannot cover field of requirments for speed reduction; advantages of different gears and their application; lubrication; bearings.

STANDARDIZATION

Limits of. Limits of Standardization (Grenzen der Normung), K. Gramenz. V.D.I. Zeit., vol. 71, no. 6, Feb. 5, 1927, pp. 181–184. Investigation of limitations imposed on standardization with regard to individualism, competition, technical development and technical insurmountable difficulties.

STEAM

High-Pressure. Recent Experiments on the Properties of Steam at High Pressures, H. L. Callendar. Roy. Soc. of Arts—Jl., vol. 75, nos. 3871 and 3872, Jan. 28 and Feb. 4, 1927, pp. 265–276 and 285–299, 12 figs. Joule and Thomson equation; correction for heat loss; progressive throttling; account of arrangements adopted for procuring steady flow of steam at high pressures; electric boilers; continuous condenser method of measuring total heat of steam at high pressures; application to turbine.

STEAM ENGINES

Back-Pressure. Efficiency and Improvement of Back-Pressure Engines (Wirkungsgrad und Leistungssteigerung von Gegendruckmaschinen), E. Praetorius. V.D.I. Zeit., vol. 71, no. 6, Feb. 5, 1927, pp. 189–195, 14 figs. Thermal properties of back-pressure engines; improving efficiency by increasing initial pressure and temperature, by reducing back pressure and by use of high-evaporation temperatures; diphenyl oxide as new heat carrier; linking of power and heating.

STEAM PIPES

High-Pressure. Economic Insulation of High-Pressure Steam Lines (Wirtschaftliche Isolierung von Hochdruckdampfleitungen), L. Kollbohm. Elektrizitätswirtschaft, vol. 26, no. 425, Jan. 2, 1927, pp. 26–30, 2 figs. Results of tests show that economic value of insulation can be established with Schmidt flow meters, and continuous control can be effected.

STEAM POWER

Tropical Ocean. Steam Power from the Ocean in the Tropics. Power, vol. 65, no. 9, Mar. 1, 1927, pp. 328–330, 1 fig. Analysis of proposition for production of power from ocean water in tropics developed by G. Claude and P. Boucherot.

STEAM POWER PLANTS

Combined Heating and Power. Economic Advantages of Combined Power and Heating Services (Les avantages économiques de la production combinée de la vapeur pour la force motrice et pour le chauffage), V. Reniger. Génie Civil, vol. 90, no. 4, Jan. 22, 1927, pp. 102–104, 1 fig. Large economies can be effected by grouping industries needing much steam for heating and little for power, with those requiring much steam for power and little for heating; author assumes that 2000 kw. of electrical power is required and compares capital and running costs of 7 installations; gives tables showing steam consumption, heat balance, capital costs, and running costs per year for each installation; these can easily be modified to obtain costs, efficiencies, etc., for any other installation. See brief translated abstract in Power Engr., vol. 22, no. 252, Mar. 1927, p. 114.

Cotton Mills. New Steam Plant of Cotton Spinning and Weaving Mill in Bamberg, Germany (Die neue Dampfanlage der Mech. Baumwoll-Spinnerei und Weberei Bamberg), F. Kaiser. Zeit. des Bayerischen Revision-Vereins, vol. 31, nos. 2 and 3, Jan. 31 and Feb. 15, 1927, pp. 11–14 and 24–27. Details of new installations and results of tests; savings effected; in addition to steam plant there exists hydroelectric plant in which old Jonval turbines were replaced by new Francis turbines.

High-Pressure. Design of High-Pressure Industrial Power-Plants, R. S. Bayntun. Engrs.' Soc. West. Penn.—Proc., vol. 42, no. 9, Dec. 1926, pp. 425–441. Describes new power plant of Chesapeake Corp., in which steam boilers operating at pressure of 425 lb. pass all steam through turbine to generate most of power required for driving machinery, exhausting into existing steam header to supply mills with steam at old pressure; author shows that by this installation saving of $136,000 per year is effected, paying off whole cost of improvements in less than 3 years.

Meat-Packing Industry. Production and Use of Power in the Packing Industry, C. H. Kane. Power, vol. 65, no. 10, Mar. 8, 1927, pp. 354–355. While demand for large quantities of hot water takes up much of available low-pressure exhaust, some processes require steam at higher pressure; lack of balance between refrigeration, pumping, heating and process demands limits advantages of steam generation at very high pressure; under certain conditions purchased power in combination with privately generated power and employment of dual drive for seasonal use, has proved most economical.

STEAM TURBINES

High-Speed Condensing. A High-Speed Condensing Turbine for the Small Plant, C. R. Waller. Power, vol. 65, no. 13, Mar. 29, 1927, pp. 480–481, 4 figs. Details of De Laval multi-stage condensing steam turbine for ratings around 300 hp.; this turbine operates at 10,000 r.p.m. and is coupled to double-helical reduction gear which usually reduces speed to about 1200 r.p.m.

Hot Liquids, Energy from. Industrial Utilization of the Energy of Hot Liquid in a Steam Turbine (Utilisation industrielle de l'énergie d'un liquide chaud dans une turbine à vapeur), J. Rey. Académie des Sciences—Comptes Rendus, vol. 183, no. 23, Dec. 6, 1926, pp. 1095–1096. Author points out that system, based on same physical principle as that employed by G. Claude, was installed in 1904 in a plant at Dombasle-sur-Meurthe; it was designed for purpose of utilizing thermal energy of hot saline liquid escaping at temperature of 162 deg. from apparatus installed in this plant, for producing steam for use in a turbine; it was possible with this installation to obtain output of 300 to 400 kw. with amount of liquid available.

Impulse. Test Corrections for Impulse Steam Turbines, R. Livingstone. S. African Inst. Elec. Engrs.—Trans., vol. 17, Dec. 1926, pp. 276–290 and (discussion) 290–293, 16 figs. For convenience in calculations, heat-entropy diagram is used; in considering correction curves for turbo sets, only effect of variation of one condition at a time can be considered, assuming other conditions remain constant; total correction will then be sum of individual correction; d.c. generator variation of efficiency; a.c. generators; leaving loss, temperature, pressure and vacuum correction, etc.

Inspection. Forestalling Trouble by an Annual Inspection of Steam Turbines. Power, vol. 65, no. 11, Mar. 15, 1927, pp. 401–403, 4 figs. Coupling alignment and wear; axial and radial clearance; adjustment of reaction machines; blading defects; cleaning oil system and bearings; adjusting governing mechanism; valve and shaft packing.

Operation. New Practical Method for Operation of Turbines and Their Condensers (Nouvelle méthode industrielle pratique pour l'exploitation rationelle des Turbines et de leurs Condenseurs), H. Carra and R. Fric. Chaleur & Industrie, vol. 7, nos. 79 and 80, Nov. and Dec. 1926, pp. 629–635 and 697–704 and vol. 8, no. 81, Jan. 1927, pp. 29–38, 21 figs. Control of leakage and of pollution of condensed water; results of tests of Sulzer turbine of 2000 kw.; temperature of cooling water and of condensed water; concludes that control of condensers should be continuous and simple.

STEEL

Alloy. See ALLOY STEELS.

Austenitic Structure. The Decomposition o the Austentic Structure in Steels, O. E. Harder and R. L. Dowdell. Am. Soc. Steel Treating—Trans., vol. 11, no. 3, Mar. 1927, pp. 391–397, 12 figs. Continuation of research, paying particular attention to decomposition of austenite in liquid oxygen; six steels were included in investigation; (1) cobalt-chromium magnet steel, (2) Hadfield manganese steel, (3) high-carbon high-chromium steel, (4) high-speed steel, (5) 22 per cent nickel steel, and (6) hypereutectoid carbon steel; marked difference in stability of austenitic structure at low temperature is clearly shown; influence of stresses at liquid-oxygen temperature on decomposition of austenite.

Brittleness. Influence of Compression on the Brittleness of Steel (Influence de la compression sur la fragilté de l'acier), P. Dejean. Académie des Sciences—Comptes Rendus, vol. 184, no. 4, Jan. 24, 1927, pp. 188–189. Results of number of tests on bars with square section of 32 mm. on side forged from same billet and with same carbon content (0.80); these bars were divided into three groups and heat treated in different manners; from results it appears that as long as load on bar does not attain certain critical value, resilience of metal does not seem to be materially effected by previous compression, but beginning with that critical value resilience falls off very suddenly; this critical value varies with previous treatment of tar.

Cementation. Cementation of Mild Steel (Cémentation de l'acier doux par le cyanogène et la cyanamide), E. Perot. Académie des Sciences—Comptes Rendus, vol. 183, no. 23, Dec. 6, 1926, pp. 1108–1110, 2 figs. Use of cyanogen and of cyanamide for cementite formation as compared with ethylene and methane; cyanogen without renewing atmosphere gives results about equivalent to those obtained with ethylene or methane in continuous circulation.

Cementite Condition. The Importance of Cementite, R. G. Guthrie. Am. Soc. Steel Treating—Trans., vol. 11, no. 3, Mar. 1927, pp. 341–354, 17 figs. Author calls especial attention to what he believes to be basic and well-known points of vital importance when anticipating behavior of articles manufactured from straight carbon steel; he is of opinion that condition of cementite is of utmost importance, and that in low-carbon steels which are not to be subjected to hardening, it is desirable that cementite be in spheriodal condition but that in high-carbon steels, to be subjected to hardening, it is desirable to have cementite in lamellar form.

Chromium. See CHROMIUM STEEL.

Corrosion Fatigue. Corrosion-Fatigue of Metals as Affected by Chemical Composition, Heat Treatment and Cold Working, D. J. McAdam, Jr. Am. Soc. Steel Treating—Trans., vol. 11, no. 3, Mar. 1927, pp. 355–380 and (discussion) 380–390, 12 figs. Gives results of previous investigation, and sets forth materials, machines and specimens used in further investigation; author describes and illustrates corrosion-fatigue spots and is of opinion that transverse cracks passing through non-metallic inclusions usually surrounded by oxide coating are origins of corrosion-fatigue tests; tests were made in series of carbon steels ranging from 0.033 to 1.09 per cent carbon; experiments with carbon, nickel, high-chromium, and chromium-nickel steels; in author's opinion corrosion fatigue depends on two factors, corrosion intensity and stress range, and corrosion-fatigue limit depends on strength factor as well as on corrosion resistance.

Embrittlement. Embrittlement of Steel, A. G. Christie. Am. Water Works Assn.—Jl., vol. 17, no. 2, Feb. 1927, pp. 174–189. Progress report of subcommittee No. 6 on embrittlement of metals; certain engineers have been led to conclusion that such embrittlement as occurs is promoted by presence of caustic in waters in boiler resulting from occurrence of sodium carbonate in feedwater; other engineers have concluded that other causes contribute to this type of failure and that presence of caustic is not controlling factor; evidence and reasoning of both schools of thought are summarized; most experimental work carried on has been with waters high in carbonate or bicarbonate of soda.

Engine-Valve. Valve Steels, P. B. Henshaw. Roy. Aeronautical Soc.—Jl., vol. 31, no. 195, Mar. 1927, pp. 187–210 and (discussion) 211–217, 20 figs. Considers properties of valve steels in general use; and points out possible lines on which development is likely to take place; author places steels for forging in following order: nickel-chrome, chrome, stainless, cobalt, high-speed and silicon-chrome steel.

Fatigue Strength. Fatigue Strength of Hard Steels and Their Relation to Tensile Strength, J. M. Lessells. Am. Soc. Steel Treating—Trans., vol. 11, no. 3, Mar. 1927, pp. 413–1420 and (discussion) 1421–1424, 10 figs. Data on tensile and fatigue properties of very hard steels; application of fine extensometers to measurement of elastic properties; relationship between tensile strength, Brinell hardness and endurance limit; shows how residual stresses present in material may influence such relationship; superiority of medium-carbon steel in gear application is shown by results obtained.

Fractures. Interpretation of Steel Fractures, Priestley. Indus. Chemist, vol. 3, no. 25, Feb. 1927, pp. 63–66, 5 figs. To insure correct interpretation of any fracture, it is necessary to study causes of defects and failures in metals; principal factors are chemical composition, treatment in casting stage, mechanical working, both hot and cold, subsequent heat treatment and abuse; occurrence and types of fractures; miscellaneous influences.

Manganese. See MANGANESE STEEL.

Molybdenum in. Molybdenum in Steel. Iron & Coal Trades Rev., vol. 114, no. 3077, Feb. 18, 1927, p. 279. Review of report issued by Research Department Woolwich, on influence of molybdenum on medium-carbon steels containing nickel and chromium.

Nickel and Cobalt in. A Comparison of the Effect of Nickel and Cobalt in Steel, F. H. Allison, Jr. Am. Inst. Min. & Met. Engrs.—Trans., no. 1662-C, Mar. 1927, 11 pp., 12 figs. Chemically, both elements enter into steel in much the same manner; they are found to dissolve freely in ferrite, and are found also in solution with iron in carbide; both render carbide unstable, and nickel is probably the more deleterious agent; differences between nickel and cobalt steels are caused by individual effects which these elements exert on critical points.

Nitration. Nitration of Steels (Sur la nitruration des aciers), L. Guillet. Académie des Sciences—Comptes Rendus, vol. 183, no. 21, Nov. 22, 1926, pp. 933–935. Brinell tests have been carried out on tempered case-hardened steel, and on chrome-aluminum steel which had been nitrated by means of ammonia for 90 hr. at 510 deg. so as to produce nitrated layer 0.8 mm. thick; latter steel had greater initial hardness, and this was retained to greater extent than in cases of former, when steels were maintained at gradually increasing temperatures (from 180 to 600 deg.) for various periods of time.

Stress Distribution. Stress Distribution in Mild Steel as Indicated by Special Etching, J. D. Jevons. Engineering, vol. 123, nos. 3187 and 3189, Feb. 11 and 25, 1927, pp. 155–157 and 221–223, 41 figs. partly on supp. plate. Investigation of strain-etch figures produced on specimens of various shapes; standard cylinders under compression; notched tensile bars; influence on tensile specimens of Dalby collars; effect of direction of rolling on strain figures produced on rolled bars; influence on strain figures of chemical composition and type of steel; mechanism of deformation of mild steel; comparison of strain-etch figures with figures obtained by photoelastic methods and by scale on surface effects.

Temper Brittleness. Temper Brittleness. Metallurgist (Supp. to Engineer), Feb. 25, 1927, pp. 21–23, 2 figs. For steels which show temper brittleness there is temperature range in which, starting either from tough or brittle condition, tempering produces intermediate notched-bar impact value corresponding to equilibrium condition; tempering above this range always produces tough condition and below it causes no change; refers to paper by Guillet and Ballay in Revue de Métallurgie, giving results of repeated impact tests indicating that specimens showing temper brittleness have lower values, especially if energy of repeated blows is increased; tests were also made at increasing temperatures on tough and embrittled specimens of nickel-chromium steels; includes list of papers presenting interesting theories to explain temper brittleness.

STEEL CASTINGS

Gas Solubility in. Solubility of Gases in Cast Steel (Recherches sur la solubilité des gaz dans l'acier fondu), P. Dejean. Chimie & Industrie, vol. 16, no. 3, Sept. 1926, pp. 427–429, 3 figs. Results of investigation to determine influence of nature of gases on formation of blowholes.

Risers, Removal of. The Removal of Risers in the Steel Foundry, L. E. Everett. Am. Welding Soc.—Jl., vol. 6, no. 1, Jan. 1927, pp. 48–56. Methods of removing risers used in modern progressive steel foundries; discusses four methods of removing heads: (1) by flogging or sledging, (2) by sprue cutter, (3) by cold saw (high or low speed), (4) by oxyacetylene cutting torch; deals particularly with last method.

STEEL, HEAT TREATMENT OF

Hardening. Influence of Temperature of Quenching on Mechanical Properties of Special Low-Carbon Steels (Influence de la température de trempe sur les propiétés mécaniques d'aciers spéciaux peu carburés), M. Sauvageot. Chimie & Industrie, vol. 16, no. 3, Sept. 1926, pp. 411–419. Results of tempering tests; micrographic examination of specimens; determination of brittleness of bars after quenching and heating at different temperatures and determination of hardness of specimens taken from these bars; results of tensile tests of bars under different treatments.

Pack Hardening of Various Steels, A. Mumper. Forging—Stamping—Heat Treating, vol. 12, no. 2, Feb. 1927, pp. 53–55 and 60, 4 figs. Mention is made of several grades of steel used in making dies; heat treatment for various parts of dies; pack-hardening of tool steel often advantageous.

Tool Steel. Tool Hardening and Annealing in Railway Repair Shop at Schwerte (Die Werkzeughärterei und Glüherei im Eisenbahnausbesserwerk Schwerte), L. Kupfer and F. Böhm. Archiv für Wärmewirtschaft, vol. 8, no. 1, Jan. 1927, pp. 9–12, 11 figs. Suggestions for use of gas; measures for obtaining uniform temperatures in annealing room; results of tests on annealing and hardening furnaces; elimination of disturbing influences in pipe line.

STELLITE

Welding Application. Stelliting: A New Welding Progress, A. W. Harris. Am. Welding Soc.—Jl., vol. 6, no. 1, Jan. 1927, pp. 14–17. Stelliting is neither welding nor brazing in ordinary sense of words; it calls for blowpipe flame which contains fairly large excess of acetylene to lower flame heat and to exclude as much atmospheric oxygen as possible; stellite can be welded with electric carbon or metallic arc process, but metal resulting from oxyacetylene weld is cleaner, less porous and unalloyed; resistance to heat applications.

T

TEMPERATURE MEASUREMENTS

Electric. Temperature-Sensitive Resistors (Die Herstellung stark raumtemperaturabhängiger elektrischer Widerstände), H. Grüss. Elektrotechnik u. Maschinenbau, vol. 45, no. 1, Jan. 2, 1927, pp. 15–16. For electric measurements of temperature and for compensating purposes, resistances with ohmic value, which is greatly affected by temperature changes, are needed; satisfactory performance was obtained from iron wires sealed in glass which was filled with nitrogen-tetroxyde (N_2O_4) under pressure of 100 mm. mercury column; very stable resistors can, however, be produced with 3 per cent temperature coefficient. Abstract from Wiss. Veröff. Siemens-Konzern, vol. 4, no. 2, Oct. 1925.

TERMINALS, RAILWAY

Passenger. B. & A. Builds Union at Springfield, Mass. Ry. Age, vol. 82, no. 8, Feb. 19, 1927, pp. 507–511, 7 figs. As laid out, station is divided into two principal units; main station building, 300 ft. long by 120 ft. wide which has main-station level floor, mezzanine floor and two office floors; and large two-story wing, parallel with main building, 330 ft. long by 96 ft. wide, known as baggage, mail and express building.

Specifications. Report of Committee XIV—Yards and Terminals. Am. Ry., Eng. Assn.—Bull., vol. 28, no. 294, Feb. 1927, pp. 557–657, 6 figs. Joint operation of passenger terminals; points to be considered in consolidation and joint use of passenger terminal and in its development and operation; specifications for manufacture and installation of two-section knife-edge railway track scales; freight terminals; mechanical means for controlling or retarding movement of cars in hump yards.

TESTING MACHINES

Repeated-Bending. Repeated-Bending Testing Machine. Engineering, vol. 123, no. 3188, Feb. 18, 1927, pp. 212–214, 5 figs. Equipment for alternating-stress tests of rotating-beam type designed and constructed by C. Schenck, Darmstadt; it is suitable for research work as well as for works laboratories, having advantage that fatigue limit can be determined in few minutes by energy-consumption measurements.

TEXTILE MACHINERY

Electric Drive. Textile Electric Drive Developments, F. Nasmith. Elecn., vol. 98, no. 2543, Feb. 25, 1927, pp. 196–197, 4 figs. Improved machinery; automatic doffing devices; motor-mounting methods; installation at Bolton.

TIME STUDY

Boiler Room. Time Study in the Boiler Room, H. G. Haserodt. Indus. Mgmt. (N. Y.), vol. 73, no. 2, Feb. 1927, p. 97. Author proposes system for stimulating labor efficiency; establishing penalties; method of computing bonus; time of bonus period.

TRACTORS

Caterpillar-Track Production. Line Production of "Caterpillar" Tracks, L. C. Morrow. Am. Mach., vol. 66, no. 11, Mar. 17, 1927, pp. 437–440, 9 figs. Tracks of "Caterpillar" track-type tractors, product of Caterpillar Tractor Co., San Leandro, Cal., are made up of left-hand links, right-hand links, track pins, track bushings, cotter pins and shoes.

V

VALVES

Machining. Machining Valves to Close Limits, A. Murphy. Can. Machy., vol. 37, no. 8, Feb. 24, 1927, pp. 15–17, 9 figs. Adoption of modern production methods, to insure low costs, in manufacture of steam specialties at plant of James Morrison Brass Mfg. Co.

VENTILATION

Schools. School Ventilation from the Viewpoint of the School Architect, W. B. Ittner. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 33, no. 3, Mar. 1927, pp. 119–127, 2 figs. Claims that school-ventilation requirements represent no extremes of air conditioning that are at all formidable to architect or engineer; efficiency within full-range limits of operation are achieved in all climates and at minimum cost for conditions submitted, and performance tests prove reliability of ventilation system under competent management. Bibliography.

W

WELDING

Cast Aluminum. How to Weld Cast Aluminum. Brass World, vol. 23, no. 2, Feb. 1927, pp. 47–48, 4 figs. Difficulties encountered and how to overcome them.

Cast Iron. Autogenous and Electric Welding of Cast Iron. Metallurgist (Supp. to Engineer), Feb. 25, 1927, pp. 19–21, 2 figs. Review of work by P. Schimpke, published in Stahl u. Eisen, Aug. 26, 1926, giving comprehensive study of modern practice with particular reference to cast iron; includes sketch of moderately large autogenous plant, in which low-pressure acetylene generators formerly employed are largely superseded by medium or high-pressure generators working at pressures ranging from 3 ft. of water to one atmosphere; factors which have to be considered in electric arc welding.

Electric. See ELECTRIC WELDING, ARC.

Flow of Metal. The Flow of Welding Metal, J. B. Green. Welding Engr., vol. 12, no. 2, Feb. 1927, pp. 25–29, 13 figs. Slow-motion movies, taken with infra-red light on special film, are used to show welding qualities of filler rods.

Machine Construction by. Building Special Machines by Welding, R. E. Kinkead. Am. Mach., vol. 66, no. 10, Mar. 10, 1927, pp. 409–411, 3 figs. Single casting requirements for special machines run up unit cost; substituting built-up steel parts; how welding is applied to special-machine construction.

Oxyacetylene. See OXYACETYLENE WELDING.

Underground Pipe. Welding Found Convenient for Buried Pipe, L. A. Foster. Power Plant Eng., vol. 31, no. 5, Mar. 1, 1927, pp. 297–298, 5 figs. Years of service in underground piping for heating systems proves practicability of welding pipe joints.

WELDS

Fatigue Resistance. Suggested Program for an Investigation of the Fatigue Resistance of Welds, American Bureau of Welding, H. L. Whittemore. Am. Welding Soc.—Jl., vol. 6, no. 1, Jan. 1927, pp. 21–24. Failures of steel members of machine which was subjected to many wide variations in stress were not satisfactorily explained until investigation of fatigue properties of material showed that maximum stresses were higher than endurance limit; tentative results recently obtained indicated that endurance limit of welds may be about one-half of base metal; rotary beam machine of Farmer type is well adapted for testing welds; other suitable machines.

Physical Properties. Physical Properties of Welds Produced by Oxyacetylene or Electric Methods (Über die physikalischen Eigenschaften der mittels Acetylen-Sauerstoff oder auf elektrischen Wege geschweissten Erzeugnisse), W. Hoffman. Autogene Metallbearbeitung, vol. 20, nos. 2 and 3, Jan. 15 and Feb. 1, 1927, pp. 18–27 and 33–37, 29 figs. Physical properties of welded joints, including strength and notched hardness; quality tests; welding rods and electrodes; welding of castings; chemical phenomena in connection with welding; cold and hot welding; hot welding of cast iron. Bibliography.

THE ENGINEERING INDEX

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Mechanical Engineering Section

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ACCIDENTS

Analysis of Causes. Fewer Accidents by Analyzing Causes, R. E. Motley. Mfg. Industries, vol. 13, no. 3, Mar. 1927, pp. 189–193, 10 figs. Work of Safety, Department of Atlantic Refining Co., Philadelphia, investigating accidents which have happened and analyzing them in an attempt to provide adequate means for preventing re-occurrences; this method is credited with 20 per cent reduction of accidents in past year.

AIR COMPRESSORS

Diesel Engines. Care of the Multi-Stage Air Compressor on Diesel Engines, A. B. Newell. Nat. Engr., vol. 31, no. 4, Apr. 1927, pp. 153–156. How to deal with troublesome valves; problems connected with compressor operation; necessity of pure air; danger of overlubrication.

Rotary. New Rotary Compressor for Supercharging. Power, vol. 65, no. 13, Mar. 29, 1927, 486. New rotary compressor designed by E. Feuerheerd for use especially in supercharging of internal-combustion engines.

Turbo. Modern Developments and Installations of Turbo-Compressors, E. Blau. Nat. Engr., vol. 31, no. 1, Jan. 1927, pp. 7–10, 5 figs. Rotary compressors are replacing piston-type compressors formerly used for same purposes because of advantages which turbo-pumps possess in general over all piston machines; gas blowers for sintering machines; rotary compressors in evaporator installations; causes and elimination of "pumping." Translated from German.

Volume Control. Volume Control for Compressor Economy. Power Plant Eng., vol. 31, no. 7, Apr. 1, 1927, pp. 404–419, 13 figs. Popularity of motor-driven compressor due largely to successful application of mechanical control systems.

AIRCRAFT

British Military. Air Defences of the Empire, F. A. DeV. Robertson. Flight (Supp.), vol. 19, no. 10, Mar. 10, 1927, pp. 130–148, 50 figs. Great Britain is only country in British Empire which maintains air force proper as well as both fleet air arm and army coöperation air arm; residue of Royal Air Force; flying equipment of British Air Forces; experimental types of aircraft; British airplane engines.

Production Control. Aircraft Production. Automobile Engr., vol. 17, no. 226, Mar. 1927, p. 99. Details of simple and effective control system.

AIRCRAFT CONSTRUCTION MATERIALS

Dopes. Aero Dopes and Varnishes, H. T. S. Britton. Indus. Chemist, vol. 3, no. 26, Mar. 1927, pp. 116–120, 2 figs. Considers essential properties which should be possessed by dope film, deposited in and on surface of aircraft fabric; preparation of solutions.

AIRPLANE ENGINES

Beardmore. The Beardmore Typhoon Mark I Engine. Aviation, vol. 22, no. 10, Mar. 7, 1927, p. 471, 2 figs. Exemplifying possibilities of obtaining high powers with low revolutions ungeared.

Bristol-Cherub. The Bristol-Cherub Aero Engine. Automobile Engr., vol. 17, no. 226, Mar. 1927, pp. 80–82, 9 figs. Of horizontally opposed type, engine has two air-cooled cylinders of 90 mm. bore by 96.5 mm. stroke, cylinder center lines being $1\frac{3}{16}$ in. offset; all valve gear is below crankshaft and consequently center of gravity is below center line of engine rated at 31 hp. at normal speed of 2900 r.p.m., actual power developed is from 31 to 32 b.hp. at normal speed and from 33 to 34 b.hp. at maximum speed of 3200 r.p.m.

Curtiss. The Curtiss V-1550 and GV-1550 Engines, A. Nutt. Aviation, vol. 22, no. 10, Mar. 7, 1927, pp. 465–469, 9 figs. Discusses water and air-cooled engines.

Paris Show. Airplane Engines at the 10th Paris Aeronautical Show (Die Flugmotoren auf der 10. Pariser Luftfahrt-Ausstellung), F. Gosslau. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 18, no. 3, Feb. 14, 1927, pp. 58–67, 24 figs. Water-cooled engines, including Fiat, Farman, Lorraine, Renault, Caffort, Sauda, Panhard, Isotta-Fraschini, Breitfeld and Danek, Hispano-Suiza, etc.; and air-cooled engines including Lorraine and Armstrong, Jupiter and Salmson; future prospects for precompression; improvements noted consist of increase of main engine power to about 700 hp.; increased use of air-cooled radial engines of lower output up to 500 hp.; general use of higher compressions; higher speeds up to 200 r.p.m., and introduction of double-row air-cooled radial engine.

Sperry Oil. The Sperry Aero Engine, E. A. Sperry. Aviation, vol. 22, no. 10, Mar. 7, 1927, p. 470. Solution of weight-reduction Diesel problem suggested by use of supercharging and two-stage expansion. Paper read before Metropolitan Sec., Am. Soc. Mech. Engrs.

AIRPLANE PROPELLERS

Bending Resistance of Cross-Sections. Error Limits of Approximate Formula for Moments of Resistance (Fehlergrenzen der Näherungsformel für Widerstandsmomente), O. Steinitz. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 18, no. 3, Feb. 14, 1927, pp. 67–69, 8 figs. Gives range of validity of formula developed few years ago by author for calculation of bending-resistance moment of cross-sections which do not have simple geometric forms, especially cross-sections of air screws and other construction parts with aerodynamic profiles.

AIRPLANES

Accessories. Accessories and Equipment of Airplanes (Les accessoires et l'èquipement des avions actuels), C. Martinot-Lagarde. Technique Moderne, vol. 19, no. 5, Mar. 1, 1927, pp. 143–147, 12 figs. Deals with accessory equipment, such as controllers, radiators, fuel feed pumps, motor-control apparatus, safety apparatus, electrical and photographic equipment, etc.

Air-Cooled vs. Water-Cooled. Air-Cooled Fighters or Water-Cooled? F. W. Wead. Aviation, vol. 22, no. 12, Mar. 21, 1927, pp. 565–567, 5 figs. Navy tests show air- and water-cooled planes to have equivalent speed characteristics; water-cooled plane steadier in combat; air-cooled plane better climber.

Blackburn. The Blackburn Bluebird. Aeroplane, vol. 32, no. 11, Mar. 16, 1927, pp. 282–284, 3 figs. Two-seater side-by-side biplane designed for preliminary training and pleasure flying.

Design. Fineness, F. M. T. Reilly. Flight (Aircraft Engr.), vol. 19, no. 8, Feb. 24, 1927, pp. 100c–100e, 4 figs. Shows that by skilful design, two types, biplane and monoplane, can be brought into line, which is illustrated by comparison between Junkers G.24L., Pander Sesquiplan and Vickers "Virginia;" representing large monoplane, large biplane and machine that is half-way between two and in light-plane class; it seems that more attention is needed in external design of bodies of machines; more care in selection of wing sections, elimination of all external projections that are not absolutely essential, and undercarriages that are for service at altitude as well as on ground.

Flying Boats. See FLYING BOATS.

Fokker. The Fokker C.V.-D. Flight, vol. 19, no. 13, Mar. 31, 1927, p. 187, 2 figs. It is tractor fuselage biplane, which can be employed either as two-seater fighter, artillery-spotter, etc., or else as long-distance reconnaissance or day bombing machine.

Junkers. Junkers Giant Plane G. 31 (Junkers-Grossflugzeug G. 31). Luftfahrt, vol. 21, no. 6, Mar. 22, 1927, pp. 87–88, 2 figs. 3-engined strutless monoplane is at present largest German land plane; it is all-metal construction of corrugated duralumin sheet; intended for freight transportation as well as for combined passenger and freight; it has three cabins.

New Junkers Commercial Monoplane. Flight, vol. 19, no. 11, Mar. 17, 1927, pp. 159–169, 4 figs. G. 31 has sleeping berths and armchairs.

King Bird. The King Bird Airplane. Aviation, vol. 222, no. 10, Mar. 7, 1927, p. 475, 2 figs. Three-passenger OX-5 commercial plane.

Paris Show. Structural Details from 1926 Paris Aero Salon (Konstruktive Einzelheiten aus dem Pariser "Aero-Salon"), W. Rethel. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 18, no. 3, Feb. 14, 1927, pp. 53–57, 12 figs.; also Translation in Nat. Advisory Committee for Aeronautics—Tech. Memorandums, no. 465, Mar. 1927, 14 pp. 12 figs. Criticism of German specialists is, in general, "nothing new in airplanes to be seen;" many French pursuit and combat airplanes are high-wing monoplanes; Béchereau and De Mureaux use number of struts with expensive junctions and shock absorbers, in order to carry trussing past wheels through landing gear; Brequet has developed good spring wheel for same purpose so that he can join trussing directly to rigid axle; Levasseur dispenses with axle and wheel springs; endeavors are everywhere being made to improve landing-gear shock absorbers; described two types of metal floats; Fokker exhibits well-developed all-steel tail skid on his CV; to fasten cowling, Fokker uses single lugs about 7.87 in. apart; for fuselage framework, so-called "wood and wire" type of construction is much used in France; Fiat fuselage has steel-tubing framework consisting of four longerons connected by zigzag diagonal struts; Besson has all-wood structure in large boat seaplane.

Performances. Comparison of Aircraft Performances, H. A. Mettam. Flight (Aircraft Engr.), vol. 19, no. 8, Feb. 24, 1927, pp. 100a–100c, 1 fig. Derivation of Everling quantities in British symbols and units, and their correlation with methods of performance comparison already in use in England.

Seaplanes. See SEAPLANES.

Slot Control. The Handley Page Slot-and-Aileron Lateral Control. Flight, vol. 19, no. 10, Mar. 10, 1927, pp. 150–151, 1 fig. Describes combination of leading edge slots and ailerons of various types for lateral control at or beyond stalling angle.

Wing Spars. Approximations for Column Effect in Airplane Wing Spars, E. P. Warner and M. Short. Nat. Advisory Committee for Aeronautics—Report, no. 251, 1927, pp. 3–20, 15 figs. Attempts to provide for approximate column-effect corrections that can be

NOTE.—The abbreviations used in indexing are as follows:

Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

Chromium. See CHROMIUM STEEL.

Corrosion Fatigue. Corrosion-Fatigue of Metals as Affected by Chemical Composition, Heat Treatment and Cold Working, D. J. McAdam, Jr. Am. Soc. Steel Treating—Trans., vol. 11, no. 3, Mar. 1927, pp. 355-380 and (discussion) 380-390, 12 figs. Gives results of previous investigation, and sets forth materials, machines and specimens used in further investigation; author describes and illustrates corrosion-fatigue spots and is of opinion that transverse cracks passing through non-metallic inclusions usually surrounded by oxide coating are origins of corrosion-fatigue tests; tests were made in series of carbon steels ranging from 0.033 to 1.09 per cent carbon; experiments with carbon, nickel, high-chromium, and chromium-nickel steels; in author's opinion corrosion fatigue depends on two factors, corrosion intensity and stress range, and corrosion-fatigue limit depends on strength factor as well as on corrosion resistance.

Embrittlement. Embrittlement of Steel, A. G. Christie. Am. Water Works Assn.—Jl., vol. 17, no. 2, Feb. 1927, pp. 174-189. Progress report of subcommittee No. 6 on embrittlement of metals; certain engineers have been led to conclusion that such embrittlement as occurs is promoted by presence of caustic in waters in boiler resulting from occurrence of sodium carbonate in feedwater; other engineers have concluded that other causes contribute to this type of failure and that presence of caustic is not controlling factor; evidence and reasoning of both schools of thought are summarized; most experimental work carried on has been with waters high in carbonate or bicarbonate of soda.

Engine-Valve. Valve Steels, P. B. Henshaw. Roy. Aeronautical Soc.—Jl., vol. 31, no. 195, Mar. 1927, pp. 187-210 and (discussion) 211-217, 20 figs. Considers properties of valve steels in general use; and points out possible lines on which development is likely to take place; author places steels for forging in following order: nickel-chrome, chrome, stainless, cobalt, high-speed and silicon-chrome steel.

Fatigue Strength. Fatigue Strength of Hard Steels and Their Relation to Tensile Strength, J. M. Lessells. Am. Soc. Steel Treating—Trans., vol. 11, no. 3, Mar. 1927, pp. 413-1420 and (discussion) 1421-1424, 10 figs. Data on tensile and fatigue properties of very hard steels; application of fine extensometers to measurement of elastic properties; relationship between tensile strength, Brinell hardness and endurance limit; shows how residual stresses present in material may influence such relationship; superiority of medium-carbon steel in gear application is shown by results obtained.

Fractures. Interpretation of Steel Fractures, Priestley. Indus. Chemist, vol. 3, no. 25, Feb. 1927, pp. 63-66, 5 figs. To insure correct interpretation of any fracture, it is necessary to study causes of defects and failures in metals; principal factors are chemical composition, treatment in casting stage, mechanical working, both hot and cold, subsequent heat treatment and abuse; occurrence and types of fractures; miscellaneous influences.

Manganese. See MANGANESE STEEL.

Molybdenum in. Molybdenum in Steel. Iron & Coal Trades Rev., vol. 114, no. 3077, Feb. 18, 1927, p. 279. Review of report issued by Research Department Woolwich, on influence of molybdenum on medium-carbon steels containing nickel and chromium.

Nickel and Cobalt in. A Comparison of the Effect of Nickel and Cobalt in Steel, F. H. Allison, Jr. Am. Inst. Min. & Met. Engrs.—Trans., no. 1662-C, Mar. 1927, 11 pp., 12 figs. Chemically, both elements enter into steel in much the same manner; they are found to dissolve freely in ferrite, and are found also in solution with iron in carbide; both render carbide unstable, and nickel is probably the more deleterious agent; differences between nickel and cobalt steels are caused by individual effects which these elements exert on critical points.

Nitration. Nitration of Steels (Sur la nitruration des aciers), L. Guillet. Académie des Sciences—Comptes Rendus, vol. 183, no. 21, Nov. 22, 1926, pp. 933-935. Brinell tests have been carried out on tempered case-hardened steel, and on chrome-aluminum steel which had been nitrated by means of ammonia for 90 hr. at 510 deg. so as to produce nitrated layer 0.8 mm. thick; latter steel had greater initial hardness, and this was retained to greater extent than in cases of former, when steels were maintained at gradually increasing temperatures (from 180 to 600 deg.) for various periods of time.

Stress Distribution. Stress Distribution in Mild Steel as Indicated by Special Etching, J. D. Jevons. Engineering, vol. 123, nos. 3187 and 3189, Feb. 11 and 25, 1927, pp. 155-157 and 221-223, 41 figs. partly on supp. plate. Investigation of strain-etch figures produced on specimens of various shapes; standard cylinders under compression; notched tensile bars; influence on tensile specimens of Dalby collars; effect of direction of rolling on strain figures produced on rolled bars; influence on strain figures of chemical composition and type of steel; mechanism of deformation of mild steel; comparison of strain-etch figures with figures obtained by photoelastic methods and by scale on surface effects.

Temper Brittleness. Temper Brittleness. Metallurgist (Supp. to Engineer), Feb. 25, 1927, pp. 21-23, 2 figs. For steels which show temper brittleness there is temperature range in which, starting either from tough or brittle condition, tempering produces intermediate notched-bar impact value corresponding to equilibrium condition; tempering above this range always produces tough condition and below it causes no change; refers to paper by Guillet and Ballay in Revue de Métallurgie, giving results of repeated impact tests indicating that specimens showing temper brittleness have lower values, especially if energy of repeated blows is increased; tests were also made at increasing temperatures on tough and embrittled specimens of nickel-chromium steels; includes list of papers presenting interesting theories to explain temper brittleness.

STEEL CASTINGS

Gas Solubility in. Solubility of Gases in Cast Steel (Recherches sur la solubilité des gaz dans l'acier fondu), P. Dejean. Chimie & Industrie, vol. 16, no. 3, Sept. 1926, pp. 427-429, 3 figs. Results of investigation to determine influence of nature of gases on formation of blowholes.

Risers, Removal of. The Removal of Risers in the Steel Foundry, L. E. Everett. Am. Welding Soc.—Jl., vol. 6, no. 1, Jan. 1927, pp. 48-56. Methods of removing risers used in modern progressive steel foundries; discusses four methods of removing heads: (1) by flogging or sledging, (2) by sprue cutter, (3) by cold saw (high or low speed), (4) by oxyacetylene cutting torch; deals particularly with last method.

STEEL, HEAT TREATMENT OF

Hardening. Influence of Temperature of Quenching on Mechanical Properties of Special Low-Carbon Steels (Influence de la température de trempe sur les propiétés méchaniques d'aciers spéciaux peu carburés), M. Sauvageot. Chimie & Industrie, vol. 16, no. 3, Sept. 1926, pp. 411-419. Results of tempering tests; micrographic examination of specimens; determination of brittleness of bars after quenching and heating at different temperatures and determination of hardness of specimens taken from these bars; results of tensile tests of bars under different treatments.

Pack Hardening of Various Steels, A. Mumper. Forging—Stamping—Heat Treating, vol. 12, no. 2, Feb. 1927, pp. 53-55 and 60, 4 figs. Mention is made of several grades of steel used in making dies; heat treatment for various parts of dies; pack-hardening of tool steel often advantageous.

Tool Steel. Tool Hardening and Annealing in Railway Repair Shop at Schwerte (Die Werkzeughärterei und Glüherei im Eisenbahnausbesserwerk Schwerte), L. Kupfer and F. Böhm. Archiv für Wärmewirtschaft, vol. 8, no. 1, Jan. 1927, pp. 9-12, 11 figs. Suggestions for use of gas; measures for obtaining uniform temperatures in annealing room; results of tests on annealing and hardening furnaces; elimination of disturbing influences in pipe line.

STELLITE

Welding Application. Stelliting: A New Welding Progress, A. W. Harris. Am. Welding Soc.—Jl., vol. 6, no. 1, Jan. 1927, pp. 14-17. Stelliting is neither welding nor brazing in ordinary sense of words; it calls for blowpipe flame which contains fairly large excess of acetylene to lower flame heat and to exclude as much atmospheric oxygen as possible; stellite can be welded with electric carbon or metallic arc process, but metal resulting from oxyacetylene weld is cleaner, less porous and unalloyed; resistance to heat applications.

T

TEMPERATURE MEASUREMENTS

Electric. Temperature-Sensitive Resistors (Die Herstellung stark raumtemperaturabhängiger elektrischer Widerstände), H. Grüss. Elektrotechnik u. Maschinenbau, vol. 45, no. 1, Jan. 2, 1927, pp. 15-16. For electric measurements of temperature and for compensating purposes, resistances with ohmic value, which is greatly affected by temperature changes, are needed; satisfactory performance was obtained from iron wires sealed in glass which was filled with nitrogen-tetroxyde (N_2O_4) under pressure of 100 mm. mercury column; very stable resistors can, however, be produced with 3 per cent temperature coefficient. Abstract from Wiss. Veröff. Siemens-Konzern, vol. 4, no. 2, Oct. 1925.

TERMINALS, RAILWAY

Passenger. B. & A. Builds Union at Springfield, Mass. Ry. Age, vol. 82, no. 8, Feb. 19, 1927, pp. 507-511, 7 figs. As laid out, station is divided into two principal units; main station building, 300 ft. long by 120 ft. wide which has main-station level floor, mezzanine floor and two office floors; and large two-story wing, parallel with main building, 330 ft. long by 96 ft. wide, known as baggage, mail and express building.

Specifications. Report of Committee XIV—Yards and Terminals. Am. Ry., Eng. Assn.—Bull., vol. 28, no. 294, Feb. 1927, pp. 557-657, 6 figs. Joint operation of passenger terminals; points to be considered in consolidation and joint use of passenger terminal and in its development and operation; specifications for manufacture and installation of two-section knife-edge railway track scales; freight terminals; mechanical means for controlling or retarding movement of cars in hump yards.

TESTING MACHINES

Repeated-Bending. Repeated-Bending Testing Machine. Engineering, vol. 123, no. 3188, Feb. 18, 1927, pp. 212-214, 5 figs. Equipment for alternating-stress tests of rotating-beam type designed and constructed by C. Schenck, Darmstadt; it is suitable for research work as well as for works laboratories, having advantage that fatigue limit can be determined in few minutes by energy-consumption measurements.

TEXTILE MACHINERY

Electric Drive. Textile Electric Drive Developments, F. Nasmith. Elecn., vol. 98, no. 2543, Feb. 25, 1927, pp. 196-197, 4 figs. Improved machinery; automatic doffing devices; motor-mounting methods; installation at Bolton.

TIME STUDY

Boiler Room. Time Study in the Boiler Room, H. G. Haserodt. Indus. Mgmt. (N. Y.), vol. 73, no. 2, Feb. 1927, p. 97. Author proposes system for stimulating labor efficiency; establishing penalties; method of computing bonus; time of bonus period.

TRACTORS

Caterpillar-Track Production. Line Production of "Caterpillar" Tracks, L. C. Morrow. Am. Mach., vol. 66, no. 11, Mar. 17, 1927, pp. 437-440, 9 figs. Tracks of "Caterpillar" track-type tractors, product of Caterpillar Tractor Co., San Leandro, Cal., are made up of left-hand links, right-hand links, track pins, track bushings, cotter pins and shoes.

V

VALVES

Machining. Machining Valves to Close Limits, A. Murphy. Can. Machy., vol. 37, no. 8, Feb. 24, 1927, pp. 15-17, 9 figs. Adoption of modern production methods, to insure low costs, in manufacture of steam specialties at plant of James Morrison Brass Mfg. Co.

VENTILATION

Schools. School Ventilation from the Viewpoint of the School Architect, W. B. Ittner. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 33, no. 3, Mar. 1927, pp. 119-127, 2 figs. Claims that school-ventilation requirements represent no extremes of air conditioning that are at all formidable to architect or engineer; efficiency within full-range limits of operation are achieved in all climates and at minimum cost for conditions submitted, and performance tests prove reliability of ventilation system under competent management. Bibliography.

W

WELDING

Cast Aluminum. How to Weld Cast Aluminum. Brass World, vol. 23, no. 2, Feb. 1927, pp. 47-48, 4 figs. Difficulties encountered and how to overcome them.

Cast Iron. Autogenous and Electric Welding of Cast Iron. Metallurgist (Supp. to Engineer), Feb. 25, 1927, pp. 19-21, 2 figs. Review of work by P. Schimpke, published in Stahl u. Eisen, Aug. 26, 1926, giving comprehensive study of modern practice with particular reference to cast iron; includes sketch of moderately large autogenous plant, in which low-pressure acetylene generators formerly employed are largely superseded by medium or high-pressure generators working at pressures ranging from 3 ft. of water to one atmosphere; factors which have to be considered in electric arc welding.

Electric. See ELECTRIC WELDING, ARC.

Flow of Metal. The Flow of Welding Metal, J. B. Green. Welding Engr., vol. 12, no. 2, Feb. 1927, pp. 25-29, 13 figs. Slow-motion movies, taken with infra-red light on special film, are used to show welding qualities of filler rods.

Machine Construction by. Building Special Machines by Welding, R. E. Kinkead. Am. Mach., vol. 66, no. 10, Mar. 10, 1927, pp. 409-411, 3 figs. Single casting requirements for special machines run up unit cost; substituting built-up steel parts; how welding is applied to special-machine construction.

Oxyacetylene. See OXYACETYLENE WELDING.

Underground Pipe. Welding Found Convenient for Buried Pipe, L. A. Foster. Power Plant Eng., vol. 31, no. 5, Mar. 1, 1927, pp. 297-298, 5 figs. Years of service in underground piping for heating systems proves practicability of welding pipe joints.

WELDS

Fatigue Resistance. Suggested Program for an Investigation of the Fatigue Resistance of Welds, American Bureau of Welding, H. L. Whittemore. Am. Welding Soc.—Jl., vol. 6, no. 1, Jan. 1927, pp. 21-24. Failures of steel members of machine which was subjected to many wide variations in stress were not satisfactorily explained until investigation of fatigue properties of material showed that maximum stresses were higher than endurance limit; tentative results recently obtained indicated that endurance limit of welds may be about one-half of base metal; rotary beam machine of Farmer type is well adapted for testing welds; other suitable machines.

Physical Properties. Physical Properties of Welds Produced by Oxyacetylene or Electric Methods (Uber die physikalischen Eigenschaften der mittels Acetylen-Sauerstoff oder auf elektrischen Wege geschweissten Erzeugnisse), W. Hoffman. Autogene Metallbearbeitung, vol. 20, nos. 2 and 3, Jan. 15 and Feb. 1, 1927, pp. 18-27 and 33-37, 29 figs. Physical properties of welded joints, including strength and notched hardness; quality tests; welding rods and electrodes; welding of castings; chemical phenomena in connection with welding; cold and hot welding; hot welding of cast iron. Bibliography.

THE ENGINEERING INDEX

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Mechanical Engineering Section

THE ENGINEERING INDEX presents each month, in conveniently classified form, items descriptive of the articles appearing in the current issues of the world's engineering and scientific press of particular interest to mechanical engineers. At the end of the year the monthly instalments are combined along with items dealing with civil, electrical, mining and other branches of engineering, and published in book form, this annual volume having regularly appeared since 1906. In the preparation of the Index by the engineering staff of The American Society of Mechanical Engineers some 1200 technical publications received by the Engineering Societies Library (New York) are regularly reviewed, thus bringing the great resources of that library to the entire engineering profession.

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ACCIDENTS

Analysis of Causes. Fewer Accidents by Analyzing Causes, R. E. Motley. Mfg. Industries, vol. 13, no. 3, Mar. 1927, pp. 189–193, 10 figs. Work of Safety, Department of Atlantic Refining Co., Philadelphia, investigating accidents which have happened and analyzing them in an attempt to provide adequate means for preventing re-occurrences; this method is credited with 20 per cent reduction of accidents in past year.

AIR COMPRESSORS

Diesel Engines. Care of the Multi-Stage Air Compressor on Diesel Engines, A. B. Newell. Nat. Engr., vol. 31, no. 4, Apr. 1927, pp. 153–156. How to deal with troublesome valves; problems connected with compressor operation; necessity of pure air; danger of overlubrication.

Rotary. New Rotary Compressor for Supercharging. Power, vol. 65, no. 13, Mar. 29, 1927, 486. New rotary compressor designed by E. Feuerheerd for use especially in supercharging of internal-combustion engines.

Turbo. Modern Developments and Installations of Turbo-Compressors, E. Blau. Nat. Engr., vol. 31, no. 1, Jan. 1927, pp. 7–10, 5 figs. Rotary compressors are replacing piston-type compressors formerly used for same purposes because of advantages which turbo-pumps possess in general over all piston machines; gas blowers for sintering machines; rotary compressors in evaporator installations; causes and elimination of "pumping." Translated from German.

Volume Control. Volume Control for Compressor Economy. Power Plant Eng., vol. 31, no. 7, Apr. 1, 1927, pp. 404–419, 13 figs. Popularity of motor-driven compressor due largely to successful application of mechanical control systems.

AIRCRAFT

British Military. Air Defences of the Empire, F. A. DeV. Robertson. Flight (Supp.), vol. 19, no. 10, Mar. 10, 1927, pp. 130–148, 50 figs. Great Britain is only country in British Empire which maintains air force proper as well as both fleet air arm and army coöperation air arm; residue of Royal Air Force; flying equipment of British Air Forces; experimental types of aircraft; British airplane engines.

Production Control. Aircraft Production. Automobile Engr., vol. 17, no. 226, Mar. 1927, p. 99. Details of simple and effective control system.

AIRCRAFT CONSTRUCTION MATERIALS

Dopes. Aero Dopes and Varnishes, H. T. S. Britton. Indus. Chemist, vol. 3, no. 26, Mar. 1927, pp. 116–120, 2 figs. Considers essential properties which should be possessed by dope film, deposited in and on surface of aircraft fabric; preparation of solutions.

AIRPLANE ENGINES

Beardmore. The Beardmore Typhoon Mark I Engine. Aviation, vol. 22, no. 10, Mar. 7, 1927, p. 471, 2 figs. Exemplifying possibilities of obtaining high powers with low revolutions ungeared.

Bristol-Cherub. The Bristol-Cherub Aero Engine. Automobile Engr., vol. 17, no. 226, Mar. 1927, pp. 80–82, 9 figs. Of horizontally opposed type, engine has two air-cooled cylinders of 90 mm. bore by 96.5 mm. stroke, cylinder center lines being 1[1]/16 in. offset; all valve gear is below crankshaft and consequently center of gravity is below center line of engine rated at 31 hp. at normal speed of 2900 r.p.m., actual power developed is from 31 to 32 b.hp. at normal speed and from 33 to 34 b.hp. at maximum speed of 3200 r.p.m.

Curtiss. The Curtiss V-1550 and GV-1550 Engines, A. Nutt. Aviation, vol. 22, no. 10, Mar. 7, 1927, pp. 465–469, 9 figs. Discusses water and air-cooled engines.

Paris Show. Airplane Engines at the 10th Paris Aeronautical Show (Die Flugmotoren auf der 10. Pariser Luftfahrt-Ausstellung), F. Gosslau. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 18, no. 3, Feb. 14, 1927, pp. 58–67, 24 figs. Water-cooled engines, including Fiat, Farman, Lorraine, Renault, Caffort, Sauda, Panhard, Isotta-Fraschini, Breitfeld and Danek, Hispano-Suiza, etc.; and air-cooled engines including Lorraine and Armstrong, Jupiter and Salmson; future prospects for precompression; improvements noted consist of increase of main engine power to about 700 hp.; increased use of air-cooled radial engines of lower output up to 500 hp.; general use of higher compressions; higher speeds up to 200 r.p.m., and introduction of double-row air-cooled radial engine.

Sperry Oil. The Sperry Aero Engine, E. A. Sperry. Aviation, vol. 22, no. 10, Mar. 7, 1927, p. 470. Solution of weight-reduction Diesel problem suggested by use of supercharging and two-stage expansion. Paper read before Metropolitan Sec., Am. Soc. Mech. Engrs.

AIRPLANE PROPELLERS

Bending Resistance of Cross-Sections. Error Limits of Approximate Formula for Moments of Resistance (Fehlergrenzen der Näherungsformel für Widerstandsmomente), O. Steinitz. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 18, no. 3, Feb. 14, 1927, pp. 67–69, 8 figs. Gives range of validity of formula developed few years ago by author for calculation of bending-resistance moment of cross-sections which do not have simple geometric forms, especially cross-sections of air screws and other construction parts with aerodynamic profiles.

AIRPLANES

Accessories. Accessories and Equipment of Airplanes (Les accessoires et l'équipement des avions actuels), C. Martinot-Lagarde. Technique Moderne, vol. 19, no. 5, Mar. 1, 1927, pp. 143–147, 12 figs. Deals with accessory equipment, such as controllers, radiators, fuel feed pumps, motor-control apparatus, safety apparatus, electrical and photographic equipment, etc.

Air-Cooled vs. Water-Cooled. Air-Cooled Fighters or Water-Cooled? F. W. Wead. Aviation, vol. 22, no. 12, Mar. 21, 1927, pp. 565–567, 5 figs. Navy tests show air- and water-cooled planes to have equivalent speed characteristics; water-cooled plane steadier in combat; air-cooled plane better climber.

Blackburn. The Blackburn Bluebird. Aeroplane, vol. 32, no. 11, Mar. 16, 1927, pp. 282–284, 3 figs. Two-seater side-by-side biplane designed for preliminary training and pleasure flying.

Design. Fineness, F. M. T. Reilly. Flight (Aircraft Engr.), vol. 19, no. 8, Feb. 24, 1927, pp. 100c–100e, 4 figs. Shows that by skilful design, two types, biplane and monoplane, can be brought into line, which is illustrated by comparison between Junkers G.24L., Pander Sesquiplan and Vickers "Virginia;" representing large monoplane, large biplane and machine that is half-way between two and in light-plane class; it seems that more attention is needed in external design of bodies of machines; more care in selection of wing sections, elimination of all external projections that are not absolutely essential, and undercarriages that are for service at altitude as well as on ground.

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Seaplanes. See SEAPLANES.

Slot Control. The Handley Page Slot-and-Aileron Lateral Control. Flight, vol. 19, no. 10, Mar. 10, 1927, pp. 150–151, 1 fig. Describes combination of leading edge slots and ailerons of various types for lateral control at or beyond stalling angle.

Wing Spars. Approximations for Column Effect in Airplane Wing Spars, E. P. Warner and M. Short. Nat. Advisory Committee for Aeronautics—Report, no. 251, 1927, pp. 3–20, 15 figs. Attempts to provide for approximate column-effect corrections that can be

NOTE.—The abbreviations used in indexing are as follows:

Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

graphically or otherwise expressed so as to be applied with minimum of labor; curves are plotted giving approximate values of correction factors for single and two-bay trusses of varying proportions and with various relationships between axial and lateral loads; it is further shown from analysis of those curves that rough but useful approximations can be obtained from Perry's formula for corrected bending moment, with assumed distance between points of inflection arbitrarily modified in accordance with rules given; general rules of variation of bending stress with axial load; study of best distribution of points of support along spar for various conditions of loading.

AIRSHIPS

Aircraft Carriers. Large Airships as Aircraft Carriers, R. A. deH. Haig. Aviation, vol. 22, no. 13, Mar. 28, 1927, pp. 611–614, 5 figs. British experiments with airplanes leaving and hooking on to airships in flight.

Fuels for. Liquid and Gaseous Fuels for Airships (Flüssige und gasförmige Brennstoffe im Luftschiffbetrieb), E. Lempertz. Luftfahrt, vol. 21, no. 6, Mar. 22, 1927, pp. 82–83. Refers to recent experimental use of so-called medium-weight hydrocarbon gas of approximately same specific weight as air; with this system, lifting power and load are equalized to certain extent and consumption of gas causes neither reduction of weight nor reduction of supporting power of airship, because in place of consumed gas, same quantity of air enters automatically.

Hangars and Mooring Masts. The Cardington Airship Shed and Mooring Tower. Engineer, vol. 143, nos. 3712, 3713 and 3714, Mar. 4, 11 and 18, 1927, pp. 230–231, 258–260 and 288–291, 17 figs., partly on p. 242. Reconstruction of hangar; enlarged shed was designed to withstand horizontal wind load of 35 lb. per sq. ft. on roof and of 30 lb. on sides, ends and doors; it has floor area of $4^3/_4$ acres, and capacity of 26.6 million cu. ft.; tower has overall height of 200 ft. and consists of steel-framed octagonal tower 170 ft. surmounted by circular turret; tower-head machinery; mooring operations; winch and machinery-control equipment; fuel-storage and pumping equipment.

Transatlantic. Power Calculations of Commercial Airships for Transatlantic Navigation (Leistungs-Berechnungen von Verkehrsluftschiffen für transatlantische Luftverkehrslinien), E. Steude. Zeit.-für Flugtechnik u. Motorluftschiffahrt, vol. 18, no. 3, Feb. 14, 1927, pp. 69–72, 1 fig. Presents theoretical comparative calculation, in order to show possibilities in development of airship construction, and why large airships for oversea traffic are not only more economical but technically superior.

ALLOYS

Aluminum. See ALUMINUM ALLOYS.
Bearing Metals. See BEARING METALS.
Brass. See BRASS.
Bronzes. See BRONZES.
Copper. See COPPER ALLOYS.
Iron. See IRON ALLOYS.
Magnesium. See MAGNESIUM ALLOYS.

ALUMINUM

Finishing Process. Finishing Process for Aluminum and Its Alloys (Sur un nouveau procédé d'ornementation de l'aluminium et de ses alliages), L. Guillet. Académie des Sciences—Comptes Rendus, vol. 184, no. 3, Jan. 17, 1927, pp. 134–136. Pacz has shown that if aluminum or alloy rich in aluminum is tempered in solution of sodium fluosilicate, nickel sulphate and potassium nitrate in 4 liters of water at 70 to 80 deg., colored lines appear which blacken quickly in bath; design produced may be varied according to relative motion with respect to liquid accorded to metal; deposits appear to start from impure spots on surface, and their extent is strictly limited by electrolytic protection; corrosion readily starts along lines of pattern, with formation of alumina.

ALUMINUM ALLOYS

Aluminum-Silicon. Aluminium-Silicon Alloys, H. Ehlermann. Eng. Progress, vol. 8, no. 3, Mar. 1927, pp. 75–76, 3 figs. Discusses wide use of these alloys owing to their excellent casting properties; tensile strength is increased by means of refining process; employment for pressure die castings and for structural work.

Casting. Light Aluminum Casting Alloys. Brass World, vol. 23, no. 3, Mar. 1927, p. 76. List of aluminum casting alloys presenting fairly complete arrangement of all alloys ordinarily used in aluminum foundries, and furnishing mixtures which may prove more suitable than those at present used by some establishments.

Corrosion. The Corrosion of Aluminium Alloys, H. Sutton. Metallurgist (Supp. to Engineer), Mar. 25, 1927, pp. 36–37. Resistance of aluminum to corrosion by ordinary industrial waters and sea water is in striking contrast to its position in table of electrode potentials of metals and its chemical reactivity which indicate that aluminum should be very rapidly attacked; actually, attack is rather slow and frequently local in character; resistance is due to presence of protective film of aluminum oxide or hydroxide, and to capacity of metal to combine chemically to form this protective film on freshly cut or scraped surfaces; intercrystalline corrosion; aluminum and its alloys corrode under marine conditions most severely when corrosion product is allowed to accumulate on surface; anodic oxidation process constitutes marked advance in protection of aluminum and its alloys; other methods.

Technical Importance. Aluminum Alloys and Their Technical Importance (Uber Aluminiumlegierungen und ihre Bedeutung für die Technik), W. Haas. Centralblatt der Hütten u. Walzwerke, vol. 31, no. 10, Mar. 9, 1927, pp. 115–117. Deals with binary alloys including aluminum-copper, aluminum-zinc, aluminum-silicon and aluminum-manganese alloys; most important ternary alloy is duralumin, but in recent years number of similar alloys have been placed on market; refers to process developed by Strasser Bros. in Switzerland, for producing aluminum alloys which, without refining, possesses sufficiently high strength; electric purification process.

Wrought. Wrought Light Alloys, W. Rosenhain. Metallurgist (Supp. to Engineer), Mar. 25, 1927, pp. 39–40, 1 fig. Review of present position in regard to light alloys available for structural purposes in rolled and forged condition; question arises as to whether duralumin is still best available structural light alloy; review of other alloys which makes it clear that, however useful and meritorious duralumin has proved, it has by no means attained maximum that can be anticipated from aluminum alloys.

AMMONIA

Vapor Tension of Solutions. Vapor Tension of Ammonia Solutions, J. E. Starr. Ice & Refrigeration, vol. 72, no. 3, Mar. 1927, pp. 252–253. Revival of interest as to properties of ammonia solutions in water due to attempts made to produce very small apparatus where cost is of greater importance than efficiency of performance; data on subject entirely sufficient for practical commercial purposes available.

AMMONIA COMPRESSORS

Control Equipment. Investigation of Performance of Small Ammonia Refrigerating Plant Equipped with Regulating and Control Equipment of South German Machinery and Metal Works (Sümak) [Leistungsuntersuchung einer Kleinkältemaschinenanlage für Ammoniak versehen mit einer Regel- und Kontrolleinrichtung der Süddeutschen Maschinen- und Metallwarenfabrik (Sümak) Wilhelm Weckerle in Zuffenhausen], R. Stückle. Zeit. für die gesamte Kälte-Industrie, vol. 34, no. 2, Feb. 1927, pp. 28–32, 1 fig. Results of tests on horizontal single-acting compressor with Sümak regulating and control equipment, to determine net and total refrigerating capacity, condenser output, and indicated output of compressor with uniform evaporating and condenser pressure; results are given in tabular form.

Modern Design. Fashionable Styles in Ammonia Compressors, H. J. Macintire. Power, vol. 65, no. 17, Apr. 26, 1927, pp. 621–622, 2 figs. Tendency of times is to increase rotative speeds of refrigerating compressors; in inclosed type of compressor it is becoming practice to have flywheel type of synchronous motor.

Water Jacketing. Water Jacketing for Compressors, W. Fischer. Refrig. Eng., vol. 13, no. 8, Feb. 1927, p. 260. Account of research endeavoring to finally dispose of question at hand for completely jacketed compressors; work was done on double-acting horizontal machine, the variable under study being isolated by comparable tests with and without water in jacket. Translated from Forschungsarbeiten, no. 244, 1921.

AMMONIA CONDENSERS

Design and Operation. A Challenge to Refrigerating Designers, H. J. Macintire. Power, vol. 65, no. 12, Mar. 22, 1927, pp. 437–438, 3 figs. Critical examination of present-day ammonia condensers; all are found faulty and better design is predicted.

Economic Balances in the Design and Operation of the Ammonia Condenser, T. K. Sherwood. Refrig. Eng., vol. 13, no. 8, Feb. 1927, pp. 253–259, 8 figs. Value of economic balances in determination of most economical operating conditions and equipment sizes; heat transfer in ammonia condensers; relation is derived between resistance to heat transfer in condenser and power cost for compressor; economic balances determining optimum cleaning cycle, water rate, and condenser size.

APPRENTICES, TRAINING OF

Automotive Industry. A Comprehensive Apprenticeship Program for the Automotive Industry, H. A. Frommelt. Soc. Automotive Engrs.—Jl., vol. 20, no. 4, Apr. 1927, pp. 443–453, 4 figs. Author remarks that one of the greatest future developments in automotive field will take place through training of personnel; outstanding examples of success of personnel training prove by facts possibility of comprehensive application of apprenticeship; describes Army personnel training at Camp Holabird at Baltimore.

Economic Value. The Economic Value of Apprentices, S. De Hart. Indus. Mgmt. (N. Y.), vol. 73, no. 4, Apr. 1927, pp. 227–228, 3 figs. Methods and policy of LeBlond Machine Tool Co.; apprentices are not matter of cost but are form of investment; it is not necessary to have a very elaborate or expensive apprenticeship system in order to obtain results.

Methods. The Training of Trades Apprentices. Mech. Eng., vol. 49, no. 5, May 1927, pp. 421–425. Grading system important; starting and keeping apprentices in regular production departments found satisfactory; follow-up of graduate apprentices; value of incentives; selection of apprentices; efficient teachers essential, etc.

ASH HANDLING

Hydromechanical Plants. Hydro-Mechanical Conveying, Reichel. Indus. Mgmt. (Lond.), vol. 14, no. 4, Apr. 1927, p. 120. Describes plants for handling ashes and clinkers from boilers and gas producers; hydraulic conveyor meets most stringent requirements, effects considerable saving in cost and by quenching dust, heat and gas; produces ideal hygienic conditions at small expense.

AUTOMOBILE ENGINES

Acceleration. Acceleration of Multi-Cylinder Engines, R. Pettigrew-Thomson. Automobile Engr., vol. 17, no. 226, Mar. 1927, pp. 100–101, 1 fig. Shows that if inertia of reciprocating masses be neglected, speed is not affected by number of cylinders; if speed of 8-cylinder engine under constant load be taken a standard of efficiency, 6-cylinder engine of same nominal horsepower and with same load would suffer variation of speed of about 0.75 per cent, which variation would be doubled for 4-cylinder engine.

Cylinder-Block Machining. Machining the Morris Cylinder Block, I. W. Chubb. Am. Mach., vol. 66, nos. 9, 10, 11, 12 and 13, Mar. 3, 10, 17, 24 and 31, 1927, pp. 359–362, 413–415, 445–448, 481–483 and 527–528, 36 figs. For machining cylinder blocks there are two lines, one entirely special, and other, while embodying more important principles of special line is composed mainly of standard machines adapted for special operations; latter is supplemented by number of machines designed by Morris engines to suit its requirements. Mar. 17: Drilling and reaming valve-guide holes; boring valve throats; special machine for tapping; tools for boring and reaming cylinders. Mar. 24: Electrically driven special machines for drilling and boring; milling camwheel clearance. Mar. 31: Special machines for tapping; washing by machine; milling, broaching and burnishing crankshaft bearings.

Design and Operation. Automobile Fuels and Their Influence on Design and Operation of Automobile Engines (Die Kraftstoffe und ihr Einfluss auf Bau und Betrieb der Automobilmotoren), W. Ostwald. Allgemeine Automobil-Zeitung, vol. 28, nos. 6, 7 and 8, Feb. 5, 12, and 19, 1927, pp. 22–24, 26–29 and 23–26, 15 figs. Points out that heretofore engines have been built to conform with requirements of existing fuels and suggests that engines be built on other lines, with idea of adapting fuels to engines, instead of engines to fuels; notes on gasoline, benzol, lignite gasoline, and synthetic fuels. Address before Technical High School of Hannover.

Inspecting Parts. Inspecting Yellow Sleeve-Valve Engines, C. O. Herb. Machy. (N. Y.), vol. 33, no. 8, Apr. 1927, pp. 567–569, 5 figs. Typical gaging operations that insure accurate results.

Supercharging. The Supercharging of Aircraft and Motor Vehicle Engines, A. H. R. Fedden. Automobile Engr., vol. 17, no. 226, Mar. 1927, pp. 106–112 and (discussion) 112–114, 14 figs. Describes main types of compressors which have already been applied to high-speed internal-combustion engines, advantages and difficulties of this form of supercharging, and likely lines of development.

AUTOMOBILE MANUFACTURING PLANTS

England. The Works of Clement Talbot, Ltd. Automobile Engr., vol. 17, no. 226, Mar. 1927, pp. 83–87, 8 figs. Production methods of new 14–45 hp. chassis.

Mass Production. Progress Methods Employed in a Large Mass Production Motor Works, H. G. Glover. Junior Instn. Engrs., vol. 37, Feb. 1927, pp. 210–215. Deals with some of systems generally employed in engineering works where mass production is carried out on large scale; purchase sanctions; urge and record cards; urging of rough and finished parts, shortage bulletins; bulletin board; rough material taken from stores for machining.

AUTOMOBILES

Bugatti. New 2300 cc. Straight-Eight Bugatti. Autocar, vol. 58, no. 1637, Mar. 18, 1927, pp. 423–424, 3 figs. Super-sporting type of supercharged touring car with remarkable acceleration, brakes and suspension.

Differentials. A Gearless Differential. Motor Transport, vol. 44, no. 1151, Apr. 4, 1927, p. 415, 3 figs. Simplifies back-axle construction; invention by A. Abramson, which has been designed to eradicate, or lessen, faults of conventional differential and reduces production costs.

New Gearless Differential Invented by Russian Engineer, P. M. Heldt. Automotive Industries, vol. 56, no. 15, Apr. 16, 1927, pp. 573–574, 4 figs. Differential of type which drives through inner wheel only when describing curves, invented by Abramson; it has been extensively tried out by Skoda Works of Czechoslovakia and adopted by this concern for use on cars manufactured by it; among advantages claimed is that it is cheaper to manufacture than conventional differential.

Electric. Electric Propulsion at the Berlin Motor Show, 1926 (Die elektrischen Fahrzeuge auf der Automobil-Austellung Berlin 1926), W. Rödiger. Elektrotechnische Zeit., vol. 47, no. 47, Nov. 25, 1926, pp. 1377–1379, 5 figs. Details of saloon car built by J. S. Rasmussen & Co.; Hansa Lloyd Works exhibited 10-hp. omnibus seating 21 passengers, also $1^1/_2$-ton electric truck; Faunwerke Nurnberg showed 26-hp. gasoline-electric vehicle; engine drives 300-volt, compound-wound generator supplying power to two series motors; electric braking is employed.

Hazards. Automobile Hazard in Cities and Its Reduction, W. J. Cox. Am. Soc. Civil Engrs.—Proc., vol. 53, no. 4, Apr. 1927, pp. 513–539, 3 figs. Directs attention to great variations in hazard of automobile operation in larger cities of United States; shows what this variation is; derives theoretical formula to account for it; shows applicability of this formula to cities of United States; discusses conclusions resulting from investigation, which show great extent to which street hazard is controllable by proper city planning and zoning measures.

Rover. The 16–50 HP. Rover. Auto-Motor Jl., vol. 32, no. 11, Mar. 17, 1927, pp. 225–228, 11 figs. Two outstanding features mark design of engine, one is shape of combustion chamber, and other is placing of sparking plug immediately in exact center of hemispherical head; engine, clutch and gear, and steering gear are combined in one unit, which also includes all electrical accessories for starting, lighting and ignition; cooling is by water impeller.

Shimmying. Mechanics of Front-Wheel Shimmy. Soc. Automotive Engrs.—Jl., vol. 20, no. 4, Apr. 1927, pp. 423–425, 1 fig. Gyroscopic theory explains how shimmy starts and why it continues; Professor Huebotter's analysis; two applicable gyroscopic properties; derivation of equations; practical application; factors that may reduce shimmy.

Suspension. Suspension Systems, W. G. Aston. Autocar, vol. 58, no. 1639, Apr. 1, 1927, pp. 521–526, 19 figs. Of late there has been decided increase in popularity of half-elliptic springs, while other types have lost ground appreciably; why this should be so is explained; author sets forth advantages of different suspension systems in vogue; question of spring-base is dealt with, and various original designs described.

AUTOMOTIVE FUELS

Airships. See AIRSHIPS, FUELS FOR.

Gasoline. See GASOLINE.

Makhonine Carburant. Tests with Makhonine Carburant for Commercial Airplanes (Les essais du carburant Makhonine dans l'aviation marchande). Aéronautique, vol. 9, no. 93, Feb. 1927, pp. 41–43, 3 figs. Results of tests carried out by two French aviation companies, including tests during flight.

Oil-Engine. The Supply of Fuel for Oil Engines, E. J. Kates. Power, vol. 65, no. 13, Mar. 29, 1927, pp. 484–486, 2 figs. Extent of oil underground not known; new field discovered each year; most of fuel oil now used uneconomically under boilers; no decided increase in price for decades.

Vegetable Wastes. Running a Gas Engine on Vegetable Waste. English & Amateur Mechanics, vol. 1, no. 22, Mar. 25, 1927, pp. 367–368, 5 figs. Important British development of far-reaching possibilities for country and Colonial purposes.

AVIATION

Civil. Civil Aviation, N. J. Hulbert. Instn. Aeronautical Engrs.—Jl., vol. 1, nos. 1, 2 and 3, Jan., Feb. and Mar. 1927, pp. 35–36, 27–28 and 19–20. Review of development; author points out there is considerable public apathy toward adopting aerial transport, because it is very expensive, but primarily because public regard it as dangerous; author discusses these two objections and means of overcoming them.

Commercial. Commercial Aerial Navigation (La navigazione aerea commerciale), G. Vallecchi. Sindacato Nazionale Fascista Ingegneri, vol. 2, no. 1, Jan. 1927, pp. 4–9, 1 fig. Deals with commercial, technical and financial problems and aspects.

Europe. European Air Transportation, H. D. Lindsley. Aviation, vol. 22, no. 13, Mar. 28, 1927, pp. 617–619, 3 figs. Report on development of civil aviation in Europe.

Night Flying. Night Flying in Bad Weather, E. T. Allen. Aviation, vol. 22, no. 10, Mar. 7, 1927, pp. 461–463, 2 figs. Some air-mail pilot's problems; outlines problems involved and ways in which they may be expected to be solved in near future.

B

BALANCING

Static and Dynamic. Static and Dynamic Balancing, A. K. Burditt. Am. Mach., vol. 66, no. 16, Apr. 21, 1927, pp. 643–646, 8 figs. Growth in importance of dynamic balancing methods; old and present-day methods used in static balancing; how balancing machines are used.

BALANCING MACHINES

Static. Gisholt Static Balancing Machine. Machy. (N. Y.), vol. 33, no. 8, Apr. 1927, pp. 624–625, 3 figs. Designed for flywheels, clutches, automobile wheels and wheel parts, pump impellers and other narrow-faced parts.

BEARING METALS

Production and Refining. The Production and Refining of White Bearing Metals. Engineering, vol. 123, no. 3191, Mar. 11, 1927, pp. 282–284, 2 figs. Influence of copper in low-tin metals; in metals high in tin, lead is considered impurity which may be present in comparatively small amounts only; melting-pot plant for cleaning and alloying of white bearing metals; suitable scrap metals; how copper is removed from scrap; methods of refining.

BEARINGS

Critical Speeds Due to Lubricants. Critical Speeds as Result of Yielding Quality of Lubricants in Bearings (Kritische Drehzahlen als Folge der Nachgiebigkeit des Schmiermittels im Lager), C. Hummel. Forschungsarbeiten auf dem Gebiete des Ingenieurwesens, no. 287, 1926, 48 pp., 51 figs.; also abstract in V.D.I. Zeit., vol. 71, no. 12, Mar. 19, 1927, pp. 379–382, 13 figs. Based on hydrodynamic bearing theory field of force in oil groove between shaft and bearing is calculated, taking into consideration lateral discharge; based on this calculation it can be demonstrated that equilibrial position of shaft becomes stable or labile depending upon whether its ratio of eccentricity, that is, relation of its true to maximum eccentricity, is greater or less than 0.7; vibrations occurring in labile area are not so dangerous as those occurring in second critical speed; bearings should be so designed that area of critical occurrences should be avoided. Includes supplementary article, by A. Stodola, on Critical Shaft Perturbation Due to Yielding Quality of Oil Pad in Bearing.

Testing. The Latest Testing Equipment in Göttingen Experimental Station of German State Railway (Die neuesten Prüfstände in der Versuchsabteilung Göttingen), E. Schulze. Verkehrstechnik, vol. 43, no. 53, Dec. 31, 1926, pp. 905–909, 10 figs. Describes two experimental arrangements recently installed in order to test friction in journal and roller bearings, etc.; results are to be used as basis for new bearing designs and for improving lubrication of rolling-stock bearings.

BEARINGS, ROLLER

Standardization. The Standardization of Roller Bearings (Die Normung der Rollenlager), H. Gärtner. Werkstattstechnik, vol. 21, no. 1, Jan. 1, 1927, pp. 8–10, 8 figs. In author's opinion, advantages of standardization from producer's standpoint are small in comparison with disadvantages from user's standpoint.

Tolerances. Roller-Bearing Tolerances and Fits (Wälzlager-Toleranzen und -Passungen), J. Kirner. Werkstattstechnik, vol. 21, no. 6, Mar. 15, 1927, pp. 165–167. Tolerance position of external dimensions of bearing; tolerance coefficients in external dimensions; standards of internal dimensions.

BELT DRIVE

Horizontal Quarter-Turn. Report of Experiments on Horizontal Quarter-Turn Drives, R. F. Jones. Belting, vol. 30, no. 3, Mar. 1927, pp. 22–32, 6 figs. Study of transmission capacity as compared with normal horizontal drives; information on correct pulley sizes and centers.

BLAST FURNACES

Hot-Blast Stoves. Combined Gas and Air Admission for Hot-Blast Stoves (Kombinierte Gas- und Lufteinführung für Winderhitzer), J. Stoecker. Stahl u. Eisen, vol. 47, no. 12, Mar. 24, 1927, pp. 493–494, 3 figs. System of combined gas and air admission, advantages of which are low initial cost, safety against explosion; good mixture of gas and air, takes up little space, and is very durable; system has been used successfully for number of years on hot-blast stoves for three blast furnaces in Bochumer Verein, Bochum, Germany.

Spiral Bricks for Hot Stoves, J. Tornblad. Iron & Coal Trades Rev., vol. 114, no. 3082, Mar. 25, 1927, p. 483, 1 fig. New type of checker bricks, so-called spiral bricks (Hartmann patents) which are manufactured in three sizes; among advantages claimed are that every part of surface partakes equally in heat storage; surface area of bricks is comparatively large; weight of bricks per unit volume of checkerwork is considerably less than with other types, etc.; gives results obtained at Ilsede Iron Works, Germany. See also Foundry Trade Jl., vol. 35, no. 554, Mar. 31, 1927, pp. 277–278, 1 fig.

Oxidation Processes. The Influence of Oxidation Processes in the Blast Furnace, F. Wüst. Iron & Coal Trades Rev., vol. 114, no. 3082, Mar. 25, 1927, pp. 480–481, 3 figs. Reoxidation of iron in front of tuyeres is of wholly unexpected importance; surprising results attained by use of hot blast and more recently of dried air are due to diminution in oxidation zone in front of tuyeres; there can be no escaping from conclusion that in usual blast-furnace practice, considerable hitherto unsuspected portion of iron already reduced is reoxidized to extent which must seriously prejudice economy of process; author compares extent of oxidizing zone in three furnaces; full advantage of wider hearths can only be realized if volume of blast is increased in greater ration than size of hearth; how further improvements can easily be effected in design and working of blast furnaces. Translated from Stahl u. Eisen. See also translation in Foundry Trade Jl., vol. 35, no. 554, Mar. 31, 1927, pp. 279–281, 2 figs.

BLOWERS

Impellers, Cycloidal Curves. The Generation of Cycloidal Curves, P. M. Mueller. Mech. Eng., vol. 49, no. 4, Apr. 1927, pp. 359–360, 6 figs. Deals with generation of cycloidal forms of impellers using standard machine tools equipped with relatively inexpensive fixtures; chief advantage obtaining with this method lies in elimination of hand-filed templets and in inherent accuracy obtainable from straight-line cutting edges and simple rotary motion.

BOILER EXPLOSIONS

Autogenously Welded Boiler. Explosion of an Autogenously Welded Boiler (Explosion d'une chaudière construite par soudure autogène). Génie Civil, vol. 90, no. 10, Mar. 5, 1927, pp. 245–246, 2 figs. Result of investigations by C. Fremont on boiler which exploded in 1925 showing that welding was decidedly defective, metal itself being contaminated by segregation and showing brittleness on tests; conclusion arrived at is that French regulations for welding of pressure vessels are inadequate to prevent occurrence of accidents.

BOILER FEEDWATER

High-Pressure Boilers. Feedwater Treatment for High-Pressure Boilers (Speisewasserversorgung der Hochdruckkessel), V. Rodt. Zeit. des Bayerischen Revisions-Vereins, vol. 31, no. 1, Jan. 15, 1927, pp. 5–6. Points out that large amount of salt which must be removed from feedwater for high-pressure boilers cannot be extracted by any chemical purification process; turbine exhaust steam and condensation water are used as feedwater, but remaining additional water must be obtained by thermal treatment, that is, precipitation of water from steam; with this process it is necessary to evaporate water economically with exhaust steam, and in condensation of this water heat of condensing steam must be utilized for preheating of feedwater; systems of this kind have already been developed by different firms.

Treatment. Thermal Methods of Feedwater Treatment (Die thermische Speisewasseraufbereitung), R. Blaum. V.D.I. Zeit., vol. 71, no. 9, Feb. 26, 1927, pp. 285–290, 12 figs. An exhaust-steam evaporator makes no additional demand on boiler and heat content in evaporated steam is regained in feedwater preheater; under these conditions, evaporator ceases to be emergency device and becomes regular element of power plant; author recommends two-stage preheating; in one stage auxiliary steam is available at high pressure, and in other at low pressure; degasification of water can be best carried out in mixed preheaters; under land installations most important factor to be considered is very large scale of operation; heat loss in central stations can be kept considerably below that on shipboard; shows that it is possible to find proper solution for problem of water distillation, whether boiler is equipped with economizers or regenerators and air preheaters; describes central-station installation where bled steam is used for heating and water raised to temperature of 65 deg. cent. See brief translated abstract in Mech. Eng., vol. 49, no. 5, May 1927, pp. 465–467, 3 figs.

BOILER FURNACES

Air Preheating. Practical and Theoretical Investigations on Utilization of Flue Gases for Preheating of Combustion Air (Praktische und theoretische Untersuchungen zur Ausnutzung der Rauchgase für die Vorwärmung der Verbrennungsluft), B. Schulz. Brennstoff- und Wärmewirtschaft, vol. 9, no. 5, Mar. 1, 1927, pp. 104–110, 5 figs. Deals with utilization of flue gas through preheating of feedwater, with special reference to experimental results with preheated combustion air; these tests cover installations with and without air or feedwater preheating.

Producer-Gas-Fired. Producer Gas as Fuel for High-Power and High-Pressure Boilers (Generatorgas als Brennstoff für Grossleistungs- und Hochdruckkessel), D. J. Hudler. Feuerungstechnik, vol. 15, nos. 7 and 8, Jan. 1 and 15, 1927, pp. 737–6 and 89–90, 3 figs. Relations between hourly output and flame temperature; comparison between efficiency obtainable with high-grade producer gas and that obtained with good grate furnaces; results show that advantages of producer-gas firing are no longer limited to high-temperature furnace, but can be used to advantage in generation of high-pressure steam.

Pulverized-Coal. Temperatures in Powdered-Coal Furnaces Having Extended Radiant-Heat-Absorbing Surfaces, R. A. Sherman. Mech. Eng., vol. 49, no. 4, Apr. 1927, pp. 335–338, 8 figs. Progress Report of A.S.M.E. Special Research Committee on Boiler-Furnace Refractories.

BOILER OPERATION

Economy in. Operating Boilers at the Minimum Cost, C. M. Ware. Combustion, vol. 16, no. 3, Mar. 1927, pp. 153–154, 2 figs. By operating boiler short period and then calculating furnace and fuel-burning equipment maintenance per ton of fuel burned, and repeating many times for short and long and intermediate periods of operation, general characteristic curve can be established, which will show generally that furnace and fuel-burning equipment maintenance, per ton of fuel burned, is at minimum after certain operating period.

BOILER TUBES.

Design. Modern Methods Influence Boiler Tube Size. Power Plant Eng., vol. 31, no. 7, Apr. 1, 1927, p. 402, 1 fig. Heine VX boiler, new bent-tube type, designed for pressures in excess of 325 lb. gage with particular reference to increased tube spacing and reduced tube diameters.

BOILERMAKING

Shops. Boiler Shop of the Ames Iron Works. Boiler Maker, vol. 27, no. 3, Mar. 1927, pp. 65–69, 11 figs. Average annual output of 2500 tons of finished products turned out by shop force of 120 men.

BOILERS

Blow-Off. Design and Use of the Boiler Blow-Off, C. L. Hubbard. Textile World, vol. 71, no. 14, Apr. 2, 1927, pp. 63–65, 11 figs. Limiting degree of concentration of water in boiler by blowing down; method of determining quantity of water to be blown off daily; precautions required in blowing off boiler; arrangement and protection of blow-off pipes; valves and cocks; blow-off tanks.

Electric. Electric Boilers. AEG Progress, vol. 2, no. 1–2, Apr. 1926, pp. 40–44, 4 figs. Electric boilers for low-tension direct and single-phase or 3-phase current; indirect and direct resistance heating; Tenzold system of electric boilers and its advantages.

Factory Power Plants. Selecting the Factory Power Plant Boiler, W. A. Shoudy. Mfg. Industries, vol. 13, no. 3, Mar. 1927, pp. 185–188, 5 figs. Principles governing choice of most suitable installation.

Locomotive. See LOCOMOTIVE BOILERS.

Pulverized-Coal-Fired. Calumet Boiler Generates 300,000 lb. of Steam per Hour. Power, vol. 65, no. 14, Apr. 5, 1927, pp. 519–520, 3 figs. Interesting application of pulverized fuel for central-station use has been made in Calumet Station of Commonwealth Edison Co.

Ratings. Boiler Ratings—and Other Absurdities, R. H. Allen. Combustion, vol. 16, no. 3, Mar. 1927, pp. 161–162. Author points out that before reforms can be brought about, it is necessary to demonstrate their necessity, and with this in view, he discusses figures from boiler test published in recent bulletin; operating costs depend on thermal efficiency and quality of coal; both should therefore be stated and it should be made clear whether gross or net calorific value of coal is basis of figures.

Safety Valves. Fundamentals of Safety-Valve Design, R. J. S. Pigott. Power, vol. 65, no. 16, Apr. 19, 1927, pp. 580–583, 8 figs. Certain basic principles apply to all types of safety valves; these are clearly explained and illustrated by their application to design of high-lift valve.

Waste-Heat. Results of Tests on Waste Heat Boilers, M. Ebner and M. Hayes. Blast Furnace &

Steel Plant, vol. 15, no. 4, Apr. 1927, pp. 191–192, 1 fig. Installation of boilers on three 90-ton open-hearth furnaces; after service of 9 months, operation is checked.

BRAKES

Auto-Variable Power. Braking Tests with the Chamon System of Braking with Auto-Variable Power (Essais de freinage avec le frein à puissance auto-variable système "Chamon"), L. Poullain. Revue Générale des Chemins de Fer, vol. 46, no. 1, Jan. 1927, pp. 29–33, 2 figs. Describes operation of this system and gives results made on four cars.

BRASS

Electric Melting. Twenty-Five Years of Non-Ferrous Electrothermics; Fifteen Years of Electric Brass Melting, H. W. Gillett. Am. Electrochem. Soc.—Advance Papers, for mtg., Apr. 28–30, 1927, no. 24, 20 pp. Electrothermics finds some application in annealing and heat treatment of non-ferrous alloys, but its chief application is in melting; proportion of electrically melted metal is much greater in brass industry than in steel industry; electric brass melting is now practically standardized upon 3 specific types of furnaces.

BRASS FOUNDRIES

Walworth Mfg. Co., South Boston. Gravity Harnessed to Carry Brass Foundry Products, P. Dwyer. Foundry, vol. 55, no. 7, Apr. 1, 1927, pp. 250–253 and 280, 9 figs. Combines all brass manufacturing activities, foundry, finishing and machine shop in one high building; this foundry is one of first to be erected and operated on self-contained plan; equipped with battery of 7 oil-fired furnaces; most of castings are molded in snap flasks and molds are stacked two-high for conservation of space.

BRONZES

Bearing-Metal. Bearing Metal Bronzes, H. J. Roast and F. Newell. Eng. Jl., vol. 10, no. 4, Apr. 1927, pp. 213–221, 35 figs. Essential constants of bronzes in every-day use as determined by series of tests with metals carried out under practical working conditions.

Nickel-Aluminum. Nickel Aluminum Bronzes, E. D. Gleason. Metal Industry (N. Y.), vol. 25, no. 4, Apr. 1927, p. 149. Alloy is superior to phosphor, manganese and gun bronzes and special steels as set forth by U. S. Navy on specifications for inspection of materials; sand-cast materials; various bronzes and their properties.

C

CABLEWAYS

Aerial Tramway vs. Cable Haulage. Cable Haulage vs. Aerial Tramways (Standseilbahn und Luftseilbahn), H. H. Peter. Schweizerische Bauzeitung, vol. 89, no. 5, Jan. 29, 1927, pp. 56–58, 1 fig. Compares building costs and efficiency of two systems, showing advantages of latter.

Aerial Tramways. Aerial Ropeway at Rufford Colliery. Iron & Coal Trades Rev., vol. 114, no. 3083, Apr. 1, 1927, p. 517, 3 figs. Erected for automatic disposal of whole of dirt brought up from pit, pickings from belts and washery shale; it is 1800 ft. long overall and has carrying capacity of 30 tons per hr. in 10-cwt. net loads with dispatch of 60 loads per hr.; rope line has average gradient of 1 in 30 against load.

Aerial Tramway Spanning River Opens Up Markets Unreached by Water Transportation. Coal Age, vol. 31, no. 14, Apr. 7, 1927, pp. 491–493, 4 figs. Buckets carry coal over long high span at rate of 200 tons per hour; railroad cars and river barges may be loaded at same time; mine is no longer dependent on river markets alone.

Development of Austrian Aerial Tramways, H. Lawrence. Commerce Reports, no. 14, Apr. 4, 1927, pp. 19–20, 1 fig. Since 1925 number of aerial tramway lines have been completed in Austria and others are under construction or planned; these lines have brought out several remarkable improvements, both technically and commercially, over earlier constructions; adapting cableways to passenger traffic; features of car construction and operation.

Carrying Cable. The Carrying Rope of the Kreuzeck Ropeway. Eng. Progress, vol. 8, no. 3, Mar. 1927, p. 60, 2 figs. Results of continuous tests of different types of cable carried out under conditions corresponding to future service conditions; test piece was 26 ft. long and was provided with two soldered wires in outer layer of wires; tests were continued until roller has passed 2,000,000 times over test piece; two fractured wires were discovered in test rope, and solderings were intact; laying out and stringing of cable.

CALORIMETERS

Bomb. The "Scholes" Bomb Calorimeter. Iron & Coal Trades Rev., vol. 114, no. 3080, Mar. 11, 1927, p. 397, 1 fig. Designed to obviate defects of existing types; bomb is inverted so that cover forms base on which it stands, and ignition rods are attached to base.

Metal. An Improved Metal Calorimeter for Determination of Specific Heat of Metals, Oxides and Slag (Ein verbessertes Metallkalorimeter zur Bestimmung der spezifischen Wärme von Metallen, Oxyden und Schlacken), W. Grosse and W. Dinkler. Stahl u. Eisen, vol. 47, no. 11, Mar. 17, 1927, pp. 448–453, 6 figs. Instrument for determination of specific heat in temperature ranges of 100 to 1600 deg.; calibration of calorimeter; results of tests; device is combination of Oberhoffer vacuum process with Nernst-Lindermann calorimeter.

CAR DUMPERS

Electric. First Electrically Operated Car Dumper, C. C. Clymer and C. S. Albright. Elec. World, vol. 89, no. 14, Apr. 2, 1927, pp. 700–702, 4 figs. First all-electric machine to be used on Great Lakes; sequence of operations; features of electrical equipment.

Types. Car Dumpers (Les appareils culbuteurs pour le déchargement des wagons). Génie Civil, vol. 90, no. 10, Mar. 5, 1927, pp. 233–237, 11 figs. Deals with bascule system for handling of large quantities of material, which effects total emptying of car in one operation; this system is employed to great extent in America and also in Germany; car dumpers of Wellman Smith Owen Eng. Corp.

CARS, FREIGHT

Automobile. Automobile Cars Fitted with Traveling Cranes. Ry. Mech. Engr., vol. 101, no. 3, Mar. 1927, pp. 153–154, 3 figs. To accommodate constantly increasing freight traffic in automobiles, Union Pacific has placed in service new steel automobile cars, feature of which is 3000-lb. capacity traveling crane in each car to facilitate loading and unloading.

Mass Production. Freight Cars. Central Ry. Club of Buffalo, N. Y.—Off. Proc., vol. 35, no. 2, Apr. 1927, pp. 2308–2313. Interesting processes connected with their mass production.

CARS, PASSENGER

Sleepers. New Pullman Single Room Overnight Cars. Ry. Age, vol. 82, no. 18, Apr. 2, 1927, pp. 1071–1072, 2 figs. Equipped with bed instead of berth; each room contains full toilet facilities, compactly arranged, washstand and hopper having appearance of upholstered chair.

Steel. Norfold & Western Passenger Cars. Ry. Age, vol. 82, no. 16, Mar. 19, 1927, pp. 954–955, 3 figs. Cars of all-steel construction built at Harlan plant (Wilmington, Del.) of Bethlehem Steel Co.

CAST IRON

Constitution. The Constitution of Steel and Cast Iron, F. T. Sisco. Am. Soc. Steel Treating—Trans., vol. 11, no. 4, Apr. 1927, pp. 626–635. Discusses constitution of iron-carbon alloys containing 4.30 to 6.67 per cent carbon; constitutional changes in this series when cooled from molten state to atmospheric temperature; behavior of whole series of iron-carbon alloys containing 0.01 to 6.67 per cent carbon, in cooling from high temperature, is reviewed.

Electric Melting. Gray Cast Iron from the Point of View of the Electric Furnace, G. K. Elliot. West. Machy. World, vol. 18, no. 3, Mar. 1927, pp. 122–123 and 136. Correct understanding of chemistry of both acid and basic-hearth electric furnaces should lie at foundation of every decision for or against adoption of electric furnace in competition with cupola; points of difference in behavior of basic and acid furnaces toward molten cast iron.

Grate Bars. Cast Iron Alloy Developed for Grate Bars. Ry. Mech. Engr., vol. 101, no. 3, Mar. 1927, pp. 181–182, 2 figs. Placed on market under trade name of Nogroth metal, an air-furnace product; its structure resembles that of white cast iron and has many properties of cast steel; it retains its original strength at high temperatures, nor will it grow when exposed to temperatures below melting point.

Improvement. The Refinement of Cast-Iron by Mechanical Process. Fuels & Furnaces, vol. 5, no. 4, Apr. 1927, pp. 501–502. Mechanical process, described by M. Irresberger before Society of German Foundrymen, consists in subjecting liquid cast iron to violent shaking or vibrating motion, which activates and accelerates such reactions as are known to occur in bath; liquid iron is degasified and deoxidized, and all components of cast iron are thoroughly mixed, thus neutralizing harmful effects of sulphur; graphite is dissolved and more finely granulated structure is obtained. See reference to original article in Eng. Index 1926, pp. 130–131.

Oxygen in. Oxygen in Pig and Cast Iron (Ueber den Sauerstoff im Roh- und Gusseisen), P. Oberhoffer and E. Piwowarsky. Stahl u. Eisen, vol. 47, no. 13, Mar. 31, 1927, pp. 521–533, 5 figs. Oxygen determinations in cast iron gave, as upper permissible limit a content of 0.045 per cent O_2; results show furthermore, that greater air volumes can be admitted to cupola than are generally customary, thus increasing furnace efficiency, thermal efficiency and iron temperature; relation between oxygen and silicon content; influence on oxygen of strength. See also Giesserei, vol. 14, no. 13, Mar. 28, 1927, pp. 197–202, 1 fig.

Semi-Steel. See SEMI-STEEL.

Shear Tests. Ring Shear Tests for Cast Iron, M. Rudeloff. Metallurgist (Supp. to Engineer), Mar. 25, 1927, p. 47, 1 fig. Although ring shear test as originally proposed can be performed more rapidly and with smaller specimens than more usual mechanical tests, it nevertheless requires specimen about 20 mm. in length and 25 mm. in diameter from which test piece of special shape has to be machined; investigation has been extended to include simplified punch test, in which all that was required was thin disk of material about 2 mm. in thickness; expressions obtained may be used with good accuracy to deduce, from punch tests, other mechanical properties for cast irons having punch shear strengths ranging from 18 to 32 kg. per sq. mm. Translated from Giesserei, vol. 13, Aug. 14 and 21, 1926. See reference to original article in Eng. Index, 1926, p. 132.

CASTING

Centrifugal. Centrifugal Casting of Steel, L. Cammen. Can. Machy., vol. 37, nos. 10, 11, 12, 13 and 14, Mar. 10, 17, 24, 31 and Apr. 7, 1927, pp. 32–33, 34–36, 20–21, 22–24 and 35 and 48–50, 7 figs. Deals with centrifugal tube casting and shows its present and prospective field of application and limitations, particularly where centrifugal tube casting comes into competition with piercing process. Paper read before Am. Soc. Steel Treating.

CENTRAL STATIONS

Efficiency. The Efficiency of a Power Station at Various Outputs, L. J. C. Wigan. Elec. Engr., vol. 3, no. 11, Feb. 15, 1927, pp. 423–425, 6 figs. Presents calculations for obtaining idea of theoretical amounts of coal required; station efficiency, actual and theoretical, can also be found based on average calorific value of coal of 13,230 B.t.u. as fired.

France. A Great French Power Station, T. Rich. Indus. Mgmt. (Lond.), vol. 14, no. 4, Apr. 1927, pp. 132–133, 2 figs. Details of station at Comines, outstanding features of which are coal and ash-handling facilities; plant is capable of dealing with output of 100,000 kw. and occupies site approximating 50 acres.

Operating Costs. Operating Costs of the Pasadena Power System, C. C. Brown. Power Plant Eng., vol. 31, no. 8, Apr. 15, 1927, pp. 448–450, 3 figs. Complete data on capital investment, operating costs, revenue and return of municipal system serving population of 50,000.

San Diego. Construction Details of Station "B" of the San Diego Gas & Electric Co., W. D. Campbell. Nat. Engr., vol. 31, no. 4, Apr. 1927, pp. 149–151, 2 figs. Latest additions include one 20,000-hp. turbogenerator, one 30,000-sq. ft. surface condenser and new circulating-water system; oil is used as fuel.

CHROMIUM-NICKEL STEEL

Carsil Process. The Carsil Process. Foundry Trade Jl., vol. 35, no. 552, Mar. 17, 1927, p. 235. Manufacture of high-grade nickel chrome steel from Java iron sand at works of C. G. Carlisle & Co., Sheffield.

Molybdenum in. Molybdenum in Nickel-Chromium-Medium Carbon Steels. Chem. Age (Met. Sect.), vol. 16, no. 401, Mar. 5, 1927, pp. 17–19. Investigation of influence of molybdenum carried out by Research Department, Woolwich; thermal critical ranges; microstructure and heat treatment; mechanical properties.

COAL

Calorific Power. Influence of Ash on Calorific Power (L'Influence des cendres sur le pouvoir calorifique), R. Stumper. Société Chimique de Belgique—bul., vol. 5, no. 11, Nov. 1926, pp. 417–421. Net calorific power calculated from heat of combustion, determined by bomb calorimeter and percentage of ash by given formula, is plotted against ash content for large number of Belgian coals and found to fall slightly as value of ash rises.

Pulverized. See PULVERIZED COAL.

COAL HANDLING

Wharf Facilities. B. & M. Erects Large Coal Handling Facilities at Boston. Ry. Age, vol. 82, no. 15, Mar. 12, 1927, pp. 885–888, 4 figs. New unloading towers and 440-ft. storage and reclaiming bridge will effect large savings.

COMBUSTION

Diagram. The Heat Content—Temperature Diagram of Combustion and Efficiency of Furnace (Das It-Diagramm der Verbrennung und der Wirkungsgrad von Oefen), P. Rosin. V.D.I. Zeit., vol. 71, no. 12, Mar. 19, 1927, pp. 383–388, 17 figs. Definition of thermal efficiency for furnaces; relation between calorific value and flue-gas volumes of all fuels and calorific value—volume diagrams; *It* (heat content—temperature) diagram for flue gases and its application to practical examples of furnace technique.

Surface. Applications of Surface Combustion (Les applications modernes de la combustion par surface), J. Brunswick. Technique Moderne, vol. 19, no. 3, Feb. 1, 1927, pp. 72–74, 6 figs. Present state of knowledge regarding surface combustion and recent applications of process; conditions for efficient combustion of gases showing that these are fulfilled by surface combustion on incandescent, granular, porous, refractory material; complete combustion is obtained with little or no excess air, and efficient heating is obtained by radiation from refractory material. See brief translated abstract in Power Engr., vol. 22, no. 253, Apr. 1927, p. 155.

Velocity of. Velocity of Combustion and Gas Equilibrium (Verbrennungsgeschwindigkeit und Gasgleichgewicht), W. Allner. V.D.I. Zeit., vol. 71, no. 13, Mar. 26, 1927, pp. 411–418, 12 figs. Review of older and more recent works on gas equilibria and rates of reaction in flames of solid, liquid and gaseous materials; even for high combustion and temperatures time required for reaction is not infinite and should not be neglected; time required, and decelerating and catalytically accelerating influences of combustion chamber determine extent to which reactions at high temperature approach equilibrium and extent to which equilibria in cooling room of furnace are shifted with decreasing temperature.

CONDENSERS, STEAM

Atmospheric. Atmospheric Condensers (Die Berieselungsverflüssiger), J. Huber. Archiv für Wärmewirtschaft u. Dampfkesselwesen, vol. 8, no. 3, Mar. 1927, pp. 75–79, 10 figs. Most important types of atmospheric condensers; derivation of equation for calculating temperature of trickling cooling water; calculation of temperature of condensation; influence of superheating; compares results of calculation with measurements already carried out.

Heat Transfer. Surface Condenser Heat Transfer, W. J. Dana. Power, vol. 65, no. 16, Apr. 19, 1927, pp. 584–586, 5 figs. Factors concerning coefficient of heat transfer; author attempts to correlate principal factors and proposes solutions which include several ideas that are new.

Tubes. New Metallic Packing for Condenser Tubes. Power Plant Eng., vol. 31, no. 8, Apr. 15, 1927, p. 484, 2 figs. New method of packing surface condensers developed by Crane Packing Co., Chicago.

Ill., permits use of metallic packing and, at same time, belling of inflow end of tube; makes unnecessary use of customary brass ferrule.

CONNECTING RODS

▶ **High-Speed Engines.** The Design of Connecting-rods for High-Speed Engines, H. T. Davey. Mech. World, vol. 81, no. 2099, Mar. 25, 1927, pp. 209–210, 3 figs. Shows how close estimate of stresses in connecting rod may be obtained; methods described, are applicable to such cases as gasoline engine, locomotive, and engines having rods working under similar conditions.

CONVEYORS

Industrial Application. The Industrial Application of Conveyor Systems, C. A. Burton. Mech. Eng., vol. 49, no. 4, Apr. 1927, pp. 355–356. Basic law of economics; general types of machines; materials-handling equipment in laundry industry; effect on growth of laundry industry. See also discussion of this paper and one by H. V. Coes (published in Mid-Nov. 1926 issue of journal) pp. 356–359.

Reciprocating. New Type of Reciprocating Conveyor. Indus. Mgmt. (Lond.), vol. 14, no. 4, Apr. 1927, p. 126. This system carries its own electric motor beneath and attached to trough which imparts its motions by new method; conveyor is German invention by Dr. Heymann; entire trough is caused to oscillate in such way that every portion of trough bottom describes very shallow ellipse; advantages of new method.

COPPER

Properties. Copper as Engineering Material (Kupfer als Werkstoff), P. Melchior. V.D.I. Zeit., vol. 71, no. 12, Mar. 19, 1927, pp. 373–379, 8 figs. Production of crude copper; structure and diagram of state; chemical and physical properties; influence of annealing and of impurities; defects; uses.

COPPER ALLOYS

Corson. Copper Hardened by New Method, M. G. Corson. Brass World, vol. 23, no. 3, Mar. 1927, pp. 77–79, 3 figs. What Corson alloys are; stronger cable wire possible; many uses suggested; silicon-aluminum and silver-silicon alloys.

CORROSION

Refrigerating Industry. Corrosion in the Refrigerating Industry, R. P. Russell, J. K. Roberts and E. L. Chappell. Refrig. Eng., vol. 13, no. 7, Jan. 1927, pp. 209–217, 13 figs., and (discussion) 217–219. Corrosion in brine systems; laboratory work; plant tests; corrosion in condenser systems; recommendations for treatment and instructions for application made by Committee.

COST ACCOUNTING

Standard Costs. Study of Overhead Is Simplified by Standard Costs, K. W. Stillman. Automotive Industries, vol. 56, no. 15, Apr. 16, 1927, pp. 588–590. Departmentalization of factory into production centers also an aid in getting grasp on many of production expenses which are difficult to analyze.

CRANES

Automobile. Automobile Cranes (Automobilkrane), F. Woeste. Fördertechnik u. Frachtverkehr, vol. 20, no. 6, Mar. 18, 1927, pp. 117–121, 8 figs. Advantages as compared with rail revolving cranes; development of automobile cranes and hoists; automobile revolving cranes; trailers with revolving cranes; motor trucks with built-in winches; operating costs and economy.

CUPOLAS

Gas Composition and Volume. Predetermination of Composition of Blast-Furnace Gas and Air Volume in Cupolas (Die Vorausbestimmung der Zusammensetzung der Gichtgase und der Windmenge beim Kuppelofen), B. Osann. Stahl u. Eisen, vol. 47, no. 13, Mar. 31, 1927, pp. 533–537, 1 fig. Determination of blast-furnace-gas volume and composition in relation to coke charge; calculation of air volume of oxygen and nitrogen basis.

Practice. Hints on Cupola Practice. Foundry Trade Jl., vol. 35, no. 552, Mar. 17, 1927, pp. 233–235, 4 figs. Common difficulties dealt with.

Steel-Scrap Melting. The Melting of Steel Scrap in Cupolas (A propos de la Fusion des Riblons d'acier au Cubilot), M. Guédras. Fonderie Moderne, vol. 21, Feb. 1927, pp. 35–36. Remarks based on article in Oct. 1926, issue of same journal.

CUTTING TOOLS

Rough Turning. Rough Turning with Particular Reference to the Steel Cut, H. J. French and T. G. Digges. Mech. Eng., vol. 49, no. 4, Apr. 1927, pp. 339–352 and (discussion) 352–354, 17 figs. Tests extend to current commercial high-speed tool and structural alloy steels portions of Taylor's original investigations in rough turning carbon steels and were made primarily to show effect upon tool performance of variation in chemical composition and mechanical properties of steel cut. See reference to complete article in Eng. Index, 1926, p. 224.

D

DIES

Classification. Classifying Dies in Stamping Shop, P. J. Edmonds. Forging—Stamping—Heat Treating, vol. 13, no. 3, Mar. 1927, pp. 87–88. Extended outline of general division of dies with further subdivision in detail; terms employed are defined.

DIESEL ENGINES

Aircraft. An Outline of Oil Engine Development for Aircraft, R. H. Ward. Aviation, vol. 22, no. 16, Apr. 18, 1927, pp. 773–775, 5 figs. Progress shows possibilities of light high-speed fuel-injection engine of Diesel type for aircraft.

Foos. Lightweight Diesel with Big Power Range. Motorship, vol. 12, no. 4, Apr. 1927, pp. 288–289, 3 figs. Latest Foos Type L engine, available in powers from 50 to 375 hp., incorporates simplicity in design and operation.

Hamilton-M.A.N. Hamilton-M.A.N. Double-Acting Diesel. Pacific Mar. Rev., vol. 24, no. 4, Apr. 1927, pp. 178–179, 4 figs. Hooven, Owens, Rentschler Co. 3300-hp. unit successfully completes U. S. Shipping Board 30-day non-stop test.

825 Hp. Per Cylinder in Hamilton Diesel. Oil Engine Power, vol. 5, no. 4, Apr. 1927, pp. 224–227, 7 figs. Trend to larger oil engine units seen in completion of 3300-b.hp. engine by Hooven, Owens, Rentschler.

M.A.N. A Fifteen Thousand Horsepower Diesel Engine for Hamburg, Germany. Nat. Engr., vol. 31, no. 1, Jan. 1927, pp. 1–6, 4 figs., also editorial comment on pp. 23–24. Details of 15,000-hp. Diesel engine unit recently installed in Hamburg Electric Works; engine consists of 9 cylinders of approximately 1650 hp. each; performance data and test results. Translated and abstracted from articles by W. Laudahn in V.D.I. Zeit., June 12 and Oct. 23, 1926. See references to original articles in Eng. Index, 1926, pp. 233 and 235.

Supercharging. Cheaper Oil-Engine Power Probable by Supercharging, A. Büchi. Power, vol. 65, no. 17, Apr. 26, 1927, pp. 633–655, 4 figs. Supercharging 4-stroke-cycle Diesel engines with exhaust turbo-blower increase power outlet and decrease fuel consumption.

Diesel Engines with Scavenging and Fuel Injection by Exhaust-Gas Turbo-Blowers (Moteurs Diesel avec balayage et alimentation par turbosoufflante à gaz d'échappement), A. Buchi. Génie Civil, vol. 90, no. 7, Feb. 12, 1927, pp. 161–164, 6 figs. Results of tests carried out by Swiss Society for Locomotive and Machine Construction (S.L.N.) in collaboration with Brown, Boveri & Co. on fuel injection of internal-combustion engines; main feature of these tests is that pressure of injection greatly exceeds limits heretofore attempted, and turbo-blower employed for injection is driven by exhaust gas from engine; tests were carried out on 4-cylinder 4-stroke engine.

Thermal Efficiency. On the Possibility of Increasing Thermal Efficiencies of Diesel Engines (Ueber die Möglichkeit der Erhöhung des thermischen Wirkungsgrades der Dieselmotoren), H. Koschmieder. Brennstoff- u. Wärmewirtschaft, vol. 9, nos. 2 and 3, Jan. 2 and Feb. 1, 1927, pp. 37–40 and 66–68. Discusses possibilities of utilizing, with simple means, exhaust heat of engines.

DRILLS

Twist. An Investigation of Twist Drills, B. W. Benedict and A. E. Hershey. University of Ill.—Bul., vol. 24, no. 11, Nov. 16, 1926, 76 pp., 29 figs. Comprehensive study of relation of helix angle of twist drills to power consumption and endurance, in both gray cast iron and steel, with object of determining what helix angle best satisfies inseparable requirements of (1) economy in use of power and (2) resistance of cutting edge to wear and destruction.

DYNAMOMETERS

Transmission. A Simple Transmission Dynamometer, J. C. Oakden. Engineering, vol. 123, no. 3191, Mar. 11, 1927, p. 291. Installed in laboratories of Municipal College of Technology, Manchester, to measure power output of small De Laval steam turbine.

E

ELECTRIC FURNACES

Electrothermic Processes. The Use of Electric Furnaces at Niagara Falls 1902 to 1926, F. A. J. FitzGerald. Am. Electrochem. Soc.—Advance Paper, no. 2, for mtg. Apr. 28–30, 1927, pp. 47–50, 3 figs. Presents figures showing remarkable growth of furnaces used in certain electrothermic processes in Niagara Falls during 25 years; electric-furnace processes are divided into three groups, namely: abrasives, carbon products and ferro-alloys and calcium carbide.

Heat-Treating. Tubular Electric Furnace for Heat Treating, H. O. Swoboda. Forging—Stamping—Heat Treating, vol. 13, no. 3, Mar. 1927, pp. 96–97, 1 fig. Embodies radical departure from prevalent pusher type.

Industrial Applications. Electricity in Industrial Heating. Iron Age, vol. 119, no. 13, Mar. 31, 1927, pp. 918–919. Heat-treating departments need improving; forging furnaces have faults; advantages in melting gray iron and brass electrically.

Non-Ferrous. Electric Furnaces for Non-Ferrous Metals. Metallurgist (Supp. to Engineer), Mar. 25, 1927, pp. 35–36. Review of papers and discussion presented before Institute of Metals; great difficulty which stands in way of wider application of high-frequency principle to industrial melting is first cost and upkeep of plant required for generation of high-frequency current; progress made in America in melting of larger masses of metal; question of electric annealing furnaces.

ELECTRIC LOCOMOTIVES

Developments. The Electric Locomotive for Railroad Service, F. E. Wynne. Ry. & Locomotive Eng., vol. 40, no. 3, Mar. 1927, pp. 77–81, 4 figs. Review of certain major points indicating path of progress to date with relation to some distinct American types giving bird's eye view of present position of electric locomotive and explaining lack of standardization which yet exists.

Light Traction. The Application of Light Traction and Industrial Locomotives, H. C. Hickock. Elec. Jl., vol. 24, no. 4, Apr. 1927, pp. 168–173, 7 figs. Explains factors usually involved in selecting proper locomotive equipment for conditions met in light-traction service.

Switzerland. The C-C Goods Locomotives of the Swiss Federal Railway, H. Lüthy. Brown Boveri Rev., vol. 14, no. 3, Mar. 1927, pp. 78–86, 13 figs. Most important specifications are maximum allowable weight, 72 tons; maximum allowable axle load for driving wheel, 12.5 tons; it must be possible to use locomotive with supply of 5500 volts at 25 cycles and 14,000 volts at $16^2/_3$ cycles; mechanical part consists of two 3-axle trucks and continuous locomotive frame.

ELECTRIC WELDING, ARC

Building Construction. Wide New Field Opens for Welding, G. E. Hagemann. Mfg. Industries, vol. 13, no. 3, Mar. 1927, pp. 215–216, 4 figs. Westinghouse puts up large five-story building by arc-welding process; advantages offered through medium of welded construction.

Butt-Welding Machine. Lincoln Carbon-Arc Butt Welding Machine. Am. Mach., vol. 66, no. 14, Apr. 7, 1927, p. 599, 1 fig. Recent development of Lincoln Electric Co., Cleveland, O.; it is claimed that this welder can be applied to certain classes of butt-welding problems that cannot be handled on resistance welder.

Study of. Study of Electric Autogenous Welding (Étude sur la soudure électrique autogène), H. Dustin. Revue Universelle des Mines, vol. 12, no. 5, Dec. 1, 1926, pp. 177–206, 22 figs. Results of research including study of structure and mechanical properties of welding metal and action of welding on basic metal.

ELEVATORS

Controllers. How Electric-Elevator Dual Controllers Operate, C. A. Armstrong. Power, vol. 65, no. 16, Apr. 19, 1927, pp. 596–598, 4 figs. Elevators are frequently installed and arranged with controller that permits of operation from either car switch or from push buttons; explains how one of these control systems functions.

Motor Drive. A-C. Elevator Motor Drive, E. B. Thurston. Am. Inst. Elec. Engrs.—Jl., vol. 46, no. 4, Apr. 1927, pp. 321–327, 10 figs. Outline of necessary requirements of elevator machine; desirable characteristics of motor, important ones being positive speed control, elimination of exposed and sliding contacts, speed ratios of at least 6.1, rotor of low kinetic energy, quite under operation, allowing torque characteristic changes, smooth control of speed changes, liberal temperature range, high power factor, maximum torque capacity and maximum practical starting torque per ampere; desirable characteristics of controller.

EMPLOYMENT MANAGEMENT

Eliminating Human Waste. Eliminating Human Waste in Industry. F. H. McIlvain. Mfg. Industries, vol. 13, no. 3, Mar. 1927, pp. 195–198. Author suggests seven points of attack to eliminate human waste and control labor cost; proper selection and assignment; proper introduction to work; correct shop environment; safety and accident prevention; analysis of quits; health supervision; and close contact with employee through service work.

EVAPORATORS

Heat Transmission. Heat Transmission in Evaporating Apparatus, T. Shipley. Power Plant Eng., vol. 31, no. 8, Apr. 15, 1927, pp. 472–475, 5 figs. Results of 2 years' work of York Mfg. Co.; factors affecting heat transmission in evaporating apparatus; methods of increasing heat-transfer rates; results of accurate tests on shell and tube coolers and special pipe coils.

EXHAUST STEAM

Oil Removal from. Oil Removal from Exhaust Steam (Richtlinien zur Erzielung einer befriedigenden Abdampfentölung), H. Biach. Sparwirtschaft, no. 3, Mar. 1927, pp. 131–134. Points out that in cases where exhaust steam is to be reused, thorough de-oiling is absolutely necessary because oil hinders heat exchange; it is also economical because recovered oil can be cleaned and reused; describes oil-removal apparatus and its working method; when complete de-oiling is necessary, oil remover should be built in exhaust-steam lines.

F

FANS

Ceiling. Testing of Ceiling Fans, E. Hughes and W. G. White. Instn. Elec. Engrs.—Jl., vol. 65, no. 363, Mar. 1927, pp. 367–372, 13 figs. Tests to determine influence upon measured volume of air of (1) distance of plane of observation below fan blades; (2) position of fan in, and size of, room; (3) height of fan above floor; (4) distance between fan and ceiling; (5) room temperature; (6) speed of fan; recommendations are made relating to conditions under which air velocities should be observed.

FEEDWATER HEATERS

Locomotives. Feedwater Heaters on Locomotives, V. L. Jones. New England Railroad Club—Proc., Feb. 8, 1927, pp. 254–265 and (discussion) 265–276.

Variable and fixed relations; reduced superheat; effect on back pressure and on draft; thermal efficiency of locomotive; tender capacity; points out there are two ways of utilizing benefits of feedwater heater; first and natural one is to handle situation entirely from standpoint of fuel economy; second is to develop greater earning capacity per locomotive with same amount of fuel as before.

FLOW OF AIR

Ducts. Experiments on the Flow of Air in Ducts, W. E. Cooke and I. C. F. Statham. Iron & Coal Trades Rev., vol. 114, nos. 3078, 3079 and 3080, Feb. 25, Mar. 4 and 11, 1927, pp. 320–321, 356 and 394–395, 12 figs. Advantage was taken of Rayleigh law of dynamical similarity which postulates that for all airways value of coefficient of friction is constant for any value of Reynolds criterion, provided that lining is geometrically similar; experiments on square duct; method of determining pressure drop in test length; analysis of results obtained in experimental duct. See also Colliery Guardian, vol. 133, no. 3452, Feb. 25, 1927, pp. 441–443, 8 figs.

FLUE-GAS ANALYSIS

Apparatus. Flue-Gas Control with the Siccus Apparatus (Rauchgaskontrolle mit dem Siccus-Apparat), H. Löffler. Zeit. für komprimierte und flüssige Gase, vol. 25, no. 12, Dec. 1926, pp. 141–142, 2 figs. This apparatus, patented by Strache-Kling, is portable measuring instrument requiring no subsequent filling; how CO_2 determination is carried out.

Automatic. Automatic Gas Analysis by Physical Method (Ueber selbsttätige Gasanalyse auf physikalischem Weg), O. Dommer. Archiv für Wärmewirtschaft, vol. 8, no. 3, Mar. 1927, pp. 92–93, 5 figs. Describes measuring process based on difference between density and viscosity and gives examples of its application; this method is not only applicable to determination of CO_2 and CO content but can also be used for analysis of combustible vapors, in manufacture of artificial silk, in chemical cleaning establishments, powder factories, etc.

CO_2 Recorders. A New Illuminated-Dial CO_2 Indicator. Mech. World, vol. 81, no. 2098, Mar. 18, 1927, pp. 197–198, 2 figs. It enables percentage of CO_2 in boiler-flue gases to be read at glance from considerable distance.

FLYING BOATS

Meteore. The Meteore Three-Engine Flying Boat. Aviation, vol. 22, no. 13, Mar. 28, 1927, p. 625, 1 fig. French cabin-type passenger flying boat designed for trans-Mediterranean service.

FOREMEN

Conferences. Letting Foremen Teach Themselves. Iron Age, vol. 119, no. 15, Apr. 14, 1927, pp. 1057–1059. Free conference method in small groups; educational experiment being conducted by Bridgeport Brass Co., Bridgeport, Conn., in collaboration with Federal Board for Vocational Education, Washington, working through State Board of Education.

FORGING

Hot and Cold. British and American Practice in the Working of Hot and Cold Metals, F. W. Spencer. Roy. Soc. of Arts—Jl., vol. 75, no. 3879, Mar. 25, 1927, pp. 438–450 and (discussion) 450–456, 9 figs. Types of drop hammers in use in America; forging machines for preparing bars for subsequent forging under drop hammer; production of forgings in metals other than steel, such as duralumin, brass, etc.; small forgings from cold material.

Machine. Progress in Machine Forging, C. D. Harmon. West. Machy. World, vol. 17, no 12, Dec. 1926, pp. 534–535, 10 figs. and vol. 18, no. 2, Feb. 1927, pp. 64–65 and 91. Comparison of relative merits of machine forging and drop-forging operations.

Methods. Forging Two Unusual Parts. Am. Mach., vol. 66, no. 14, Apr. 7, 1927, pp. 581–582, 4 figs. Replacing difficult casting with forging; forming in one operation; hot drawing very heavy shell; parts are being made at East Pittsburgh plant of Westinghouse Electric & Mfg. Co.

Steel. Some Notes on the Forging of Steel, O. W. Ellis. Metallurgist (Supp. to Engineer), Mar. 25, 1927, pp. 46–47. Deals first with factors affected by forging machines, namely, energy and velocity of blow; and then with factors determined by material being forged, namely, volume of metal being forged and its carbon content.

FOUNDRIES

Lighting. Artificial Lighting in Foundries, W. H. Rademacher. Safety Eng., vol. 53, no. 3, Mar. 1927, pp. 97–102, 2 figs. There is tendency to overlook obsolescence and apparent failure to appreciate economic advantages of modern lighting equipment and methods; gives list of recommended intensities; necessity for light control; application of reflectors; light distribution and placement of lighting units; color of surroundings and maintenance.

Mold and Sand Handling. Mold and Sand Handling System Attains Economies, R. J. Heiserman. Foundry, vol. 55, no. 6, Mar. 15, 1927, pp. 217–220, 8 figs. System installed by American Radiator Co. consists of one sand-handling and two power mold conveyors, installed by Link-Belt Co., Chicago; it has operated for more than a year without any changes in original layout and higher production has been attained than originally was figured.

Practice. Old-Fashioned Methods and Improvements in Foundry Practice (Rückständigkeiten und Fortschritte im Giessereiwesen), T. Ehrhardt. Giesserei, vol. 14, no. 10, Mar. 5, 1927, pp. 145–151, 6 figs. Layout and equipment of large modern foundry; improvement of unsatisfactory equipment; new materials; foundry for special-machine works; general arrangement of auxiliary plants; iron recovery from scrap; improving quality of gray iron castings.

FUELS.

See COAL; OIL FUEL; PULVERIZED COAL.

FURNACES, ANNEALING

Gas-Fired. Modern Gas-Fired Annealing Furnaces, T. Teisen. Foundry Trade Jl., vol. 35, no. 552, Mar. 17, 1927, pp. 238–239. Suiting producer to fuel; regenerative and recuperative furnaces; malleable annealing furnaces.

FURNACES, GAS

Forging and Hardening. Thermal and Operating Economy in Forging and Hardening (Wärmewirtschaft und Betriebswirtschaft in Schmieden und Härtereien), K. Kassler. Sparwirtschaft, no. 3, Mar. 1927, pp. 123–125. Points out advantages of gas firing; in spite of 50 per cent additional cost, gas furnaces effect saving of 5.65 per cent; for mass production of parts economically constructed continuous furnaces can be employed.

FURNACES, HEAT-TREATING

Design. Practical Industrial Furnace Design, M. H. Mawhinney. Forging—Stamping—Heat Treating, vol. 13, no. 3, Mar. 1927, pp. 83–86 and 88, 2 figs. Construction of furnaces for heat treating plays important part in success of operation; heating processes are explained by examples.

Types. Heat Treatment and Metallography of Steel, H. C. Knerr. Forging—Stamping—Heat Treating, vol. 13, no. 3, Mar. 1927, pp. 103–107 and 110, 3 figs. Furnace materials; essentials for good heating; types of furnaces; electric furnaces.

FURNACES, HEATING

Reversible Regeneration. The Influence of Flue Gas Temperature Upon Fuel Consumption. Metal Industry (Lond.), vol. 30, no. 9, Mar. 4, 1927, pp. 238–239, 2 figs. Attempt has been made during past few years by Davis Furnace Co., Luton, to reduce heat losses on gas-fired furnaces by adoption of system of reversible regeneration applied to air supply; design of furnace in which this principle is adopted is known as Revergen; advantages of system; typical results available upon annealing of cast-iron and steel in furnaces of Revergen type.

FURNACES, MELTING

Crucible Steel. Practical Crucible Steel Melting, J. F. Kayser. Iron & Coal Trades Rev., vol. 114, nos. 3080 and 3081, Mar. 11 and 18, 1927, pp. 396–397 and 438–439, 1 fig. Deals with coke-fired and producer-gas crucible-steel furnaces; runners are divided into two categories: (1) defects in pot when it leaves pot house, (2) defects developed in furnace; causes of runners; crucible-steel ingots.

G

GAGES

Interchangeable Work. Gaging and Interchangeability, F. C. Hudson. Am. Mach., vol. 66, no. 14, Apr. 7, 1927, pp. 575–576. Gages necessary to secure interchangeable work; confusion of "limits" and "tolerance;" advantages of unilateral tolerances in manufacturing; difference between selective and interchangeable manufacture.

GAS PRODUCERS

Mechanical. Mechanical Stokers for Gas Producers (Mechanische Stochvorrichtungen für Gaserzeuger), R. Möller. Feuerungstechnik, vol. 15, nos. 10 and 11, Feb. 15 and Mar. 1, 1927, pp. 113–116 and 123–125, 17 figs. Describes modern equipment including latest American developments.

GASOLINE

Blending with Benzol. Effect of Blending Gasoline with Benzol, C. W. Stevens. Power Plant Eng., vol. 31, no. 8, Apr. 15, 1927, p. 459, 3 figs. Distorted diagram permits of ready discernment of knocking action in internal-combustion engines.

GEAR CUTTING

Internal Clutch Teeth. Fellows Attachment for Cutting Internal Clutch Teeth. Machy. (N. Y.), vol. 33, no. 8, Apr. 1927, pp. 621–623, 3 figs. Improved method of machining clutch gears having hubs that are flush with face or extend beyond it, developed by Fellows Gear Shaper Co.; involves use of "side-trimming" gear shaper cutter which completes teeth in clutch after they have been roughed out by drilling.

GEARS

Bevel. Economical Machining of Bevel Gears in Continuous Helicoidal Milling Process (Die wirtschaftliche Kegelradbearbeitung im fortlaufenden Abwälz-Schraubfräsverfahren), H. Blaise. V.D.I. Zeit., vol. 71, no. 8, Feb. 19, 1927, pp. 255–260, 17 figs. Development of spur and bevel gear-making machines; advantages and disadvantages in production of possible involute tooth forms; details and characteristics of bevel-gear helicoidal milling machine.

Herringbone. From Spiral Bevel Gear to Cycloidal Herringbone Gear (Vom Spiralkegelrad zur zyklischen Pfeilverzahnung), P. Böttcher. Maschinenbau, vol. 6, no. 3, Feb. 3, 1927, pp. 103–109, 14 figs. Peculiarities of spiral bevel-gear helicoidal cutters; limitations to application of bevel gears with oblique tooth formation, difficulties involved; theoretical basis for cutting process for cycloidal herringbone bevel gears; design of continuous herringbone-gear cutter with planetary cutting movement; modern cycloidal herringbone gearing with perfect flank contact and axial automatic adjustment; design of similar machine for herringbone spur gear.

Hypoid, for Rear Axles. Design, Production and Application of the Hypoid Rear-Axle Gear. Soc. Automotive Engrs.—Jl., vol. 20, no. 4, Apr. 1927, pp. 464–467. Discussion of paper by A. L. Stewart and E. Wildhaber printed in June 1926, issue of Journal. See reference to original article in Eng. Index, 1926, p. 364.

Testing Apparatus. New Gear-Testing Apparatus (Neue Zahnradprüfgeräte), A. Steinle. Werkstattstechnik, vol. 21, no. 6, Mar. 15, 1927, pp. 153–156, 9 figs. Describes testing instruments for measurements of tooth flanks, and a tooth-pitch "passameter" with which space between two flanks (pitch circle) can be measured in simplest manner.

GOVERNORS

Hydraulic Turbines. Report of Tests with a Turbine Governor of Escher Wyss & Co., Zurich, Switzerland (Bericht über Versuche mit einem Turbinen-Regler der Firma Escher Wyss & Cie., Zürich), E. Braun. Schweizerische Bauzeitung, vol. 89, no. 13, Mar. 26, 1927, pp. 170–173, 10 figs. Results of tests with new acceleration governor; it was shown that governor combines in compact form all fine parts which are necessary to perfect working of turbine governor and is exceedingly adaptable.

GRINDING

Centerless. Round Bars Finished by Centerless Grinding, J. E. Caster. Iron Age, vol. 119, no. 13, Mar. 31, 1927, pp. 927–929 and 978, 8 figs. Surface defects removed and bars ground true to size within 0.0005 in.; use of process extended to 4-in. diameter stock.

Shafts. Cut Costs in Grinding Shafts, H. Rowland. Abrasive Industry, vol. 8, no. 4, Apr. 1927, pp. 114–115, 4 figs. How wide-wheel grinding is employed in finishing shafts for electric motors; novel design of work racks are used.

Unsatisfactory Finish. Unsatisfactory Finish in Grinding, C. H. Hill. Abrasive Industry, vol. 8, no. 4, Apr. 1927, pp. 112–113. In precision cylindrical grinding, trouble is experienced at times in obtaining quality of finish or degree of accuracy which is desired; these difficulties are usually of nature classed as "chatters," "spirals," or "out-of-round;" commonest causes of these troubles and rules for correcting them are given.

GRINDING MACHINES

Crankpin. Landis Crank-Pin Grinding Machine. Am. Mach., vol. 66, no. 13, Mar. 31, 1927, pp. 549–550, 3 figs. Incorporates some radical improvements in design over conventional machine, with object of obtaining lower production cost; with this machine it is possible to grind crankpins in any plane without changing set-up.

Internal. Internal Grinding Machines (Innenschleifmaschinen), W. v. Schütz. Werkstattstechnik, vol. 20, no. 24, Dec. 15, 1926, pp. 717–729, 44 figs. Discusses different types, including those with rotary movement of workpiece, and with planetary movement of spindle.

Surface. Vertical Spindle Surface Grinder. Machy. (Lond.), vol. 29, no. 754, Mar. 24, 1927, pp. 806–807, 3 figs. 13¾-in. magnetic-table grinding machine is product of Schuchardt & Schütte A. G., Berlin.

Worm. Brown & Sharpe No. 30 Automatic Worm Grinding Machine. Am. Mach., vol. 66, no. 13, Mar. 31, 1927, pp. 554–555, 2 figs. Special universal machine for grinding worm threads; it is suitable for either soft or hardened pieces.

Worm Thread Grinder. Iron Age, vol. 119, no. 13, Mar. 31, 1927, p. 940, 2 figs. Automatic machine for either soft or hardened pieces up to 8 in. in diameter.

H

HARDNESS

Rockwell and Brinell Numbers. Relationships Between the Rockwell and Brinell Numbers, S. N. Petrenko. U. S. Bur. Standards—Technologic Paper, no. 334, Jan. 10, 1927, pp. 195–222, 7 figs. Comparative Rockwell and Brinell tests were made on great variety of ferrous and non-ferrous metals; experimental values of Brinell and Rockwell numbers were inserted into given equations and constants determined; these theoretical equations with experimentally determined constants may be used to estimate, within error of plus or minus 10 per cent, Brinell number from Rockwell number; similar equations were obtained for tensile strengths of steels, which may, within error of plus or minus 15 per cent, be estimated from Rockwell number.

HEAT TRANSMISSION

Steam to Fuel Oil. The Heat Transfer from Steam to Heavy Fuel Oil, G. R. McCormick and H. Diederichs. Sibley School Mech. Eng., Eng. Experiment Station—Bul., no. 7, Feb. 1, 1927, 22 pp. 11 figs. Results of tests using heavy Mexican crude oil.

HEATING, GAS

Industrial. The Use of Gas for Heating Purposes (Die Verwendung von Gas für Heizzwecke), A. Mirbach. Centralblatt der Hütten u. Walzwerke, vol. 31, no. 12, Mar. 23, 1927, pp. 145–146, 4 figs. Points out advantages in use of gas for heating of large workshops; advantages consists in elimination of coal and ash handling and its adaptability to all weather conditions; also in its economy; describes new type of gas furnace in which gas enters in burner where it mixes with combustion air and complete combustion is effected in combustion chamber.

HEATING, HOT-WATER

Expansion and Air Venting. Expansion and Air Venting, C. L. Hubbard. Sanitary & Heat. Eng., vol. 106, no. 3, Mar. 1927, pp. 184–186 and 188, 8 figs. How air accumulates in hot-water heating system and various methods adopted for freeing system from air and providing for expansion.

HOBBING MACHINES

Pfauter. Pfauter Improved Gear Hobbers. Am. Mach., vol. 66, no. 13, Mar. 31, 1927, pp. 556–557, 2 figs. No. 4 size has capacity for stocked gears 87 in. in diameter and 23-in. face up to 1 1/4 diametral pitch.

HYDRAULIC TURBINES

Design. Modern Practice in the Construction of Hydroelectric Power Machinery (Les tendences actuelles en construction hydrotechnique). Technique Moderne, vol. 19, no. 2, Jan. 15, 1927, pp. 39–47, 18 figs. Describes hydraulic turbines and governors shown at Inland Navigation and Water Power Exhibition held at Basel in 1926; latest types of runners are illustrated, among them most recent Kaplan screw with short veins, radial distributor and runner with variable angles, which can be advantageously installed for variable heads; attention is drawn to special points in construction of each type, and their working value and specific speeds are noted.

Draft Tubes. Change in Direction of Flow of a Jet Impinging Normally on a Flat Plate (Unlenkung eines freien Flussigkeitstrahles an einer senkrecht zur Strömungsrichtung stehenden ebenen Platte), F. Reich. Forschungsarbeiten auf dem Gebiete des Ingenieurwesen, no. 290, 1926, 74 pp., 89 figs.; also abstract in V.D.I. Zeit., vol. 71, no. 8, Feb. 19, 1927, pp. 261–264, 14 figs. Investigation of form of water jet, direction of which has been changed by flat plate; experiments were made with view of ascertaining most suitable design of draft tube for high-speed turbine, such as Kaplan type and White hydraucone, which changes direction of water by means of a plate; equation is derived defining jet limit, and flow function is established for change of direction of jet.

Governors. Seewer Governor Gear for Large Pelton Wheels. Engineering, vol. 123, no. 3192, Mar. 18, 1927, pp. 317–319, 13 figs. This governor has been fitted to number of large turbines; with this governing gear very close regulation is achieved in spite of low inertia of sets to which it has been fitted.

Improvements. Improvements in Construction of Hydraulic Turbines (Importantes progresos en la construccion de turbinas hidraulicas), F. Grübler. Sociedad de Fomento Fabril—Bul., vol. 43, no. 9, Sept. 1926, pp. 637–638. Kaplan helicoidal turbine and improvements made in free-flow turbines for high heads.

Propeller-Type. The Use of Propeller Turbines of Th. Bell System for Low Heads (L'emploi des turbines-hélices, Système Th. Bell, pour les basses chutes), A. Perrig. Génie Civil, vol. 90, no. 10, Mar. 5, 1927, pp. 241–242, 3 figs. Details of extra-high-speed turbines, running at 500 to 100 r.p.m.; they are particularly well adapted to low heads; developed by firm of Bell & Co., Kriens-Lucerne, Switzerland; comparison with Francis turbines.

Swiss Type. New Developments in Foreign Waterwheel Practice. Power, vol. 65, no. 17, Apr. 26, 1927, pp. 646–647, 5 figs. Review of article by R. Dubs in Schweiz-Bauzeitung, describing activities of Escher Wyss Co., Zurich, Switzerland, in developing new type of high-speed runner and also giving interesting applications.

HYDROELECTRIC DEVELOPMENTS

Ireland. Water Powers of Shannon River Being Developed by the Irish Free State, J. K. Prendergast. Eng. News-Rec., vol. 98, no. 14, Apr. 7, 1927, pp. 554–556, 7 figs. Work under way includes the installation of 90,000 hp. in one plant; large temporary oil-driven power plant supplies electricity for great excavating machines.

Ontario. Norman Dam Power Development. Elec. News, vol. 36, no. 7, Apr. 1, 1927, pp. 32–34, 7 figs. Five 3300-kva. generators of Keewatin Power Co. supply energy at 6600 volts for grinder motors of paper mills.

HYDROELECTRIC PLANTS

California. Power Features of the Melones Project, F. M. Harris. West. Constr. News, vol. 11, no. 6, Mar. 25, 1927, pp. 30–37, 11 figs. Hydraulic and electrical features of power development; control works; pressure tunnel; manifold and penstocks; power house; turbines.

France. Eguzon Hydroelectric Plant, France (L'usine hydroélectrique d'Eguzon et la ligne de transmission d'énergie électrique d'Eguzon à Paris), A. Curchod. Revue Générale de l'Electricité, vol. 21, nos. 4 and 5, Jan. 22 and 29, 1927, pp. 129–141 and 173–190, 33 figs. Output of 75,000 hp. was added to Paris-Orleans electrification by completion of Eguzon hydroelectric station, about 100 miles south of Paris; dam 200 ft. high and 1000 ft. wide across River Creuse, provides useful head of 155 ft., which is utilized in power house located at foot of dam; five vertical-shaft spiral-type turbines, each of 15,000 hp. and 250 r.p.m. drive five 3-phase generators of 12,500 kva., 10,500 volts and 50 cycles; unique double penstock arrangement feeds three of sets from intake at left end of dam and two sets from intake at right end; outdoor switching and transformer station delivers output of plant to two transmission lines.

Germany. The Walchen Lake Hydroelectric Plant (Das Walchenseewerk), A. Menge. V.D.I. Zeit., vol. 70, nos. 36, 50 and vol. 71, no. 10, Sept. 4, Dec. 11, 1926 and Mar. 5, 1927, pp. 1177–1182, 1661–1671 and 327–330, 54 figs. Machinery and electrical equipment; movement of water in reservoirs when load is turned off; water measurement in conduits; CO_2 as protective means in case of generator fires; acceptance tests of 3-phase and single-phase generator sets; hydraulic problems; Francis turbines; auxiliary machinery; transformers and switchgear; control equipment; hydraulics.

Quebec. Hemmings Falls Development, J. S. H. Wurtele and H. S. Grove. Elec. News, vol. 36, no. 6, Mar. 15, 1927, pp. 27–32, 10 figs. Also Contract Rec., vol. 41, no. 13, Mar. 30, 1927, pp. 306–311, 10 figs. 36,000 kva. on St. Francis River a revitalizing force in eastern townships of Quebec Province; design of dam, spillway and sluiceways; waterways.

Russia. The Volkhov Hydroelectric Power Plant, I. I. Bentkowsky and A. M. Salessky. Electritchestvo, no. 1, 1927, pp. 2–19, 27 figs. Description of first large hydroelectric power plant erected in Soviet Russia. (In Russian.)

Spain. Installation of the Viesgo Electra Co. (Las instalaciones de la Sociedad anonima Electra de Viesgo). Energia Electrica, vol. 28, no. 23, Dec. 10, 1926, pp. 322–323. Company owns 7 heads; one of them is in River Pas, at Puente Viesgo; 2 at Barcena de Pie de Concha, in River Besaya, these last heads are 463 m. high with reservoir of 12,000,000 cu. m. capacity; another 2 heads are in Picos de Europa, others are in province of Santander; in basin of Aller (Oviedo) there are 2 hydroelectric installations of Viesgo Electra Co.; total capacity of all heads is 59,673 kva.

Starting Generating Units. The Chief Operator Tells How Large High-Head Hydro-Electric Units Are Started, R. B. Greenwood. Power, vol. 65, no. 12, Mar. 22, 1927, pp. 434–436, 6 figs. At Moccasin plant, San Francisco, Cal., practice has been established of starting and synchronizing generating units practically as rapidly as operating conditions permit.

Switzerland. Tremorgio Power Plant of the Officine Elettriche Ticinesi S. A., Bodio (Das Kraftwerk Tremorgio der Officine Elettriche Ticinesi S. A. Bodio), M. Trzcinski. Schweizerische Bauzeitung, vol. 89, nos. 1, 2 and 3, Jan. 1, 8 and 15, 1927, pp. 1–4, 16–18 and 28–30, 28 figs. Details of high-pressure plant utilizing fall of Lagasca-Bach; pressure conduits, machinery, pumping station, etc.

Water Storage. Problems of Economic Water Storage, P. Ogilvie. Can. Engr., vol. 52, no. 13, Mar. 29, 1927, pp. 381–383, 5 figs. Factors that must be taken into consideration when calculating water storage for generation of hydroelectric power; amount of storage and horsepower available from Coulonge River watershed calculated from Government run-off reports.

I

IMPACT TESTING

Notched-Bar. The Influence of Size of Specimen and Temperature of Stress-Deformation Curve in Notched-Bar Tests (Ueber den Einfluss der Probenbreite und der Temperatur auf den Kraftverlauf beim Kerbschlagversuch), F. Körber and H. A. v. Storp. Mitteilungen aus dem Kaiser-Wilhelm-Institut fur Eisenforschung, vol. 8, part 8, no. 67, 1926, pp. 127–134, 11 figs. Describes modified method for determination of stress-deformation curves; determination of maximum load and deflection from these curves for carbon steel at different temperatures and with different cross sections of test piece; influence of temperature on working constants and working speeds.

INDUSTRIAL MANAGEMENT

Budgeting. Budgeting in Complex Manufacturing, F. C. Shafer. Mfg. Industries, vol. 13, no. 3, Mar. 1927, pp. 173–176, 2 figs. Methods that are successful for wide variety of products and various sales channels.

Financial Control. Financial Control by Percentage Ratios in the Loose-Wiles Biscuit Company. Mfg. Industries, vol. 13, no. 3, Mar. 1927, pp. 181–184. Financial ratios or percentages offered only means of keeping in touch with progress of business in sufficient detail to be used as guide in stimulating healthy growth; production-cost ratios, and gross-profit calculations; working back from standard percentages.

Inventory Control. Simple Formulas for Inventory Control, G. Pennington. Mfg. Industries, vol. 13, no. 3, Mar. 1927, pp. 199–203, 2 figs. Determination of best lot quantity, of re-order point, and of stock reserve.

Laws. Laws of Manufacturing Management, L. P. Alford. Mech. Eng., vol. 49, no. 4, Apr. 1927, pp. 301–305 and (discussion) 305–308. Investigation is limited to manufacturing management and shows discovery of laws and determining quantitative factors for them; sets forth 43 laws of manufacturing management. See reference to complete paper in Eng. Index, 1926, p. 414.

Manager, Influence of. The First Step in Industrial Organization, A. H. Church. Mfg. Industries, vol. 13, no. 3, Mar. 1927, pp. 217–219. Critical discussion of statement in recent article by L. P. Alford, read before Am. Soc. of Mech. Engrs., that "Wise leadership is more essential to successful operation than extensive organization or perfect equipment;" in author's opinion, industrial problem and that of management in particular is in danger of becoming altogether too mechanical; devolution and not evolution is law that controls expansion of industrial unit; result of devolution process; in order to erect comprehensive science of management, this peculiar and central influence of manager that permeates the whole, must be kept steadily in mind.

Production Continuity. Production Continuity (Fliessarbeit, eine neue Form der Betriebstechnik), O. Kienzle. V.D.I. Zeit., vol. 71, no. 10, Mar. 5, 1927, pp. 309–313, 5 figs. Development of continuous-production method; elasticity of production continuity; influence of production continuity on industrial organization, and its relation to economic financing; characteristic-value curves of continuous production.

Purchasing. Economic Aspects of Purchasing, N. F. Harriman. Indus. Mgmt. (N. Y.), vol. 73, no. 4, Apr. 1927, pp. 202–204, 1 fig. Modern purchasing executive is an economist who studies his markets, price trends, raw materials and sources of supplies; he is a market and business specialist, and must be well grounded in principles of economics, especially regarding value, utility, price and cost.

Purchase Methods of the Cadillac Company, E. F. Rauss. Mfg. Industries, vol. 13, no. 3, Mar. 1927, pp. 209–214, 12 figs. Steps taken to coördinate commitments with probable sales demand.

Rate Setting. Setting Correct Rates on Repair Jobs Without Excessive Office Work, J. Winston. Indus. Mgmt. (N. Y.), vol. 73, no. 3, Mar. 1927, pp. 169–170. Shows how correct rates are being set on maintenance jobs from time studies made for work, which apparently has no relation to work under consideration.

Time Study. See TIME STUDY.

INDUSTRIAL ORGANIZATION

Functional. An Organization Largely Functional, H. F. Kneen. Sibley Jl. of Eng., vol. 41, no. 3, Mar. 1927, pp. 78–79 and 100, 2 figs. Form of organization at large tool and machine factory; it is largely functional and greatest use is made of expert advice and knowledge by splitting up entire manufacturing task into its component parts; accounting, industrial relations and purchasing department are entirely functional in form.

Philosophy of Work as Requisite. The Philosophy of Work, L. M. Gilbreth. N. Y. Railroad Club—Official Proc., vol. 37, no. 5, Apr. 1927, pp. 8308–8321. Requisite to building up effective organization; motion study and psychological tests; three-position plan of promotion and interlocking of individuals.

INDUSTRIAL PLANTS

Fuel Economy in. A Study in Heat Generation with Suggestions for Eliminating Waste, F. M. Gibson. Indus. Mgmt. (N. Y.), vol. 73, no. 3, Mar. 1927, pp. 177–183, 6 figs. Author states that nine-tenths of ton of coal are lost in generating heat in modern industrial plant for each ton actually applied to production; discusses means such as insulation and use of sufficient power generating apparatus, which will reduce this large loss to a minimum.

INSULATION, HEAT

Materials. Heat Insulation, J. S. F. Gard. Chem. & Industry, vol. 46, no. 12, Mar. 25, 1927, pp. 101T–105T, 2 figs. Based on years of experience and investigations, author states that most efficient materials, those giving best all-round results, are: for refrigeration, cold storage, water pipes, etc.—sheet cork, manufactured by treating granulated virgin cork in such manner as to form sheets of pipe sections; for steam pipes, boilers, etc., temperatures up to 700 deg. fahr.—85 per cent magnesia covering; for super-heated-steam plant, etc., temperatures 700 to 1000 deg. fahr.—modification of above which overcomes decomposition by heat of magnesia in product; for furnace work—honeycombed brick, main constituent of which is kieselguhr; method of ascertaining what saving in heat is effected by particular heat-insulating composition.

INTERNAL-COMBUSTION ENGINES

Bearing Loads. Engine Bearing Loads. Automobile Engr., vol. 17, no. 226, Mar. 1927, pp. 96–98, 4 figs. Loads of big-end bearing are due to three causes; fluid forces, inertia forces produced by reciprocating parts, and centrifugal force of rotating portions of big end; conditions of loading; variation of load with speed; weight reduction and increased speed; bearing loads and factors.

Flame Spectrography. Spectrography of Flames in a Combustion Engine (Spectrographie de flammes dans un moteur à explosion), A. Henne and G. L. Clark. Académie des Sciences—Comptes Rendus, vol. 184, no. 1, Jan. 4, 1927, pp. 26–28. Explosion spectra of combustion engine operating normally with knocking and in presence of anti-detonators, have been photographed at four stages of each explosion; extent of knocking is measurable by movement of lines of normal spectrum towards ultra-violet, and is greatest in first quarter of explosion. Knocking is due to sudden liberation of energy, effect of addition of anti-detonator being to distribute this over longer period of time.

Pinking. "Pinking" in Internal Combustion Engines, G. B. Maxwell. Fuel, vol. 6, no. 3, Mar. 1927, pp. 121–130, 6 figs. Critical survey of theories that have been advanced to account for it, and of experimental work on which they are based; "detonation" theory; "flame-vibration" theory; "nuclear" theory; factors affecting pinking; conclusions and suggestions for future research work.

Supercharging. Evolution of Internal-Combustion Motors Towards Compound Working (L'évolution du moteur à combustion interne vers la machine compound). Technique Moderne, vol. 19, no. 2, Jan. 15, 1927, pp. 57–59, 2 figs. Progress in supercharging is reviewed; in processes considered, air for combustion, or mixture of air and gas, is compressed before it is admitted into cylinder; also, energy of exhaust gases is transformed into work; by these means power developed per unit of cylinder volume is increased, and consumption of fuel per hp-hr. is reduced; test curves are reproduced showing effect of various precompressions, up to 2 atmos., on operating characteristics of 4-stroke engine; tests on 4-cylinder, 4-stroke Diesel motor of 500 hp., supercharged at 0.5 atmos.

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; OIL ENGINES.]

IRON ALLOYS

Iron-Carbon. The Diagram of State of Iron-Carbon Alloys and Its Applications (Das Zustandschaubild der Eisenkohlenstoff-Legierungen und seine Anwendung), Hanemann. V.D.I. Zeit., vol. 71, no. 8, Feb. 19, 1927, pp. 245–253, 31 figs. Describes cementite, graphite and martensite systems; results of metallographic investigations.

IRON CASTINGS

Production. Iron Castings and Their Production, H. Allen. Commonwealth Engr., vol. 14, no. 6, Jan. 1, 1927, pp. 225–228. From engineer's point of view, the higher the tensile strength of cast iron, the lighter castings can be made; sulphur below 0.1 per cent does not much affect castings, but when present in higher proportions tends to keep carbon in combination, thus resulting in hard castings which are difficult to machine; design of cupolas; reactions in melting zone of blast furnace.

Warping. Prevent Castings from Warping. Foundry, vol. 55, no. 8, Apr. 15, 1927, p. 297. Theories and remedies for cause and cure of warped castings.

L

LABOR

Stabilizing Employment. Stabilizing Employment by an Elastic Work-Day, L. F. Loree. Indus. Mgmt. (N. Y.), vol. 73, no. 3, Mar. 1927, pp. 129–134. Unique plan for regulating working hours to conform with fluctuations in business; it is quite evident that elastic day varying between limits of eight and ten hours can be used to stabilize employment.

LATHES

Cooling and Lubrication. Cooling and Lubrication of Automatic Lathes (Kühlung und Schmierung von Automaten), Obeltshauser. Maschinenbau, vol. 6, no. 5, Mar. 10, 1927, pp. 224–227, 6 figs. Influence of lubricants and coolant on machining accuracy of automatic machines; replacing rape-seed oil with mixture of equally good quality.

LIGHTING

Industrial Plants. Economic Lighting of Industrial Plants (Die wirtschaftliche Beleuchtung industrieller Betriebsstätten), Foerster. Zentralblatt der Bauverwaltung, vol. 47, no. 12, Mar. 23, 1927, pp. 131–134, 19 figs. Points out that the demand for more light must be supplemented by demand for better light; describes various types of lamps suitable for industrial lighting.

Good Lighting Means Safety, M. Luckiesh and F. Moss. Am. Mach., vol. 66, no. 12, Mar. 24, 1927, pp. 497–499, 5 figs. Accident records shown as related to daylight intensity; bad effects of partially blinding conditions.

Psychotechnical Investigations on Optimum Surface Brightness and Light Distribution in Industrial Illumination (Psychotechnische Untersuchungen über die optimale Flächenhelle und Beleuchtungsverteilung bei der Arbeitsplatzbeleuchtung), H. J. Stöer. Licht u. Lampe, nos. 1, 2, 3, 4, 5 and 6, Jan. 13, 27, Feb. 10, 24, Mar. 10 and 24, 1927, pp. 3–8, 42–46, 80–83, 117–120, 170–173 and 208–211, 36 figs. Summary of work by Cohn, Korff-Petersen, Kimura, Kobis and other physiologists, whose methods are compared with those adopted by investigators who have sought to relate illumination to output and accuracy of work; speed of discrimination and effect of fatigue experienced in long-continued industrial effort; methods employed for estimating degree of fatigue under different conditions of illumination.

LOCOMOTIVE BOILERS

Nickel-Steel Shells. Locomotive Boilers with Nickel Steel Shells. Ry. Mech. Engr., vol. 101, no. 4, Apr. 1927, pp. 196–200, 9 figs. Permits 25 per cent increase in pressure on Canadian Pacific's new 4–6–2 and 4–8–2 types.

LOCOMOTIVES

Adhesion and Rack. Adhesion and Rack Locomotives of Beyrouth-Damas Railway in Syria (Les locomotives du chemin de fer à crémaillère Beyrouth-Damas), E. Lassueur. Bul. Technique de la Suisse Romande, vol. 53, no. 6, Mar. 12, 1927, pp. 61–67, 8 figs. Describes Abt system of combined adhesion and rack locomotives which have been in use on this line for a number of years; latest type has five coupled axles and tubular feedwater; as compared with older type, fuel saving of 35 per cent is effected.

Canadian Pacific. Canadian Pacific's New Locomotives Give Improved Performance. Ry. Age, vol. 82, no. 16, Mar. 19, 1927, pp. 928–931, 5 figs. Refinements in design of Pacific and Mikado types show added efficiency in 6 months' operation.

Coaling Stations. Large Coaling Station Embodies New Features. Ry. Age, vol. 82, no. 17, Mar. 26, 1927, pp. 998–999, 4 figs. Norfolk & Western plant at Portsmouth, O., has storage capacity of 2000 tons in 2 bins.

Construction. Precision Methods in Steam Locomotive Construction, W. Massmann. AEG Progress, vol. 2, no. 8, Aug. 1926, pp. 172–176, 1 fig. Principal object in locomotive construction must be to reduce repair costs to maintain locomotive at work for longer periods, and to bring continuity of service more into line with that of other power plant; certain parts require repair more frequently than others; change is at present taking place in steam-locomotive construction which has for its object possibility of employing all modern industrial facilities on railways without delay.

Cross-Compound. British-Built Locomotives for Argentina. Ry. Engr., vol. 48, no. 566, Mar. 1927, pp. 114–118, 7 figs. Two-cylinder cross-compound engines of 2–8–2 type for heavy freight service.

Diesel-Engined. Mechanically Driven Diesel Locomotive with Rigid Transmission and Several Individual Motors Capable of Being Coupled (Die mechanisch angetriebene Diesellokomotive mit fester Uebersetzung und mehreren, einzeln kuppelbaren Motoren), O. Günther. Organ für die Fortschritte des Eisenbahnwesens, vol. 82, no. 3, Feb. 15, 1927, pp. 39–44, 2 figs. In this 2C2 locomotive, two motors installed parallel to locomotive axles in frame are provided on each shaft end with couplings which permit starting of motor without load, as well as partial or complete connecting of motors; comparison of economy of Diesel with other locomotive types; 2C2 locomotive is based on characteristics of Russian 1E1 Diesel-electric locomotive, with certain modifications.

The Swedish Diesel Locomotives with Hydraulic Clutch (Schwedische Diesellokomotive mit Flüssigkeitskupplung), O. Schminke. V.D.I. Zeit., vol. 71, no. 12, Mar. 19, 1927, pp. 389–392, 7 figs. Describes locomotive of 300 hp., with special reference to power transmission by hydraulic coupling.

Electric. See ELECTRIC LOCOMOTIVES.

Garratt. Garratt Locomotives for the Benguella Railway Company. Ry. Gaz., vol. 46, no. 13, Apr. 1, 1927, pp. 440–442, 3 figs. These are heaviest engines of their kind for 3-ft. 6-in. gage.

Graphic Performance Analysis. Graphical Methods of Analyzing the Anticipated Performance of Proposed Locomotive Design, C. A. Cardew. Ry. Engr., vol. 48, no. 566, Mar. 1927, pp. 98–100, 9 figs. Application of methods which, though not new, do not seem to be widely known to designers.

High-Pressure. Baldwin Experimental Locomotive No. 60,000. Ry. & Locomotive Eng., vol. 40, no. 3, Mar. 1927, pp. 63–71, 12 figs. Description and test results of new high-pressure 3-cylinder compound; water-tube firebox feature of design.

The "John B. Jervis"—A High Pressure Locomotive. Ry. Mech. Engr., vol. 101, no. 4, Apr. 1927, pp. 207–211, 3 figs. Also Ry. Age, vol. 82, no. 15, Mar. 12, 1927, pp. 893–896, 2 figs. Second Delaware & Hudson 2–8–0 cross-compound with water-tube firebox, carries 400 lb. boiler pressure.

Hudson Type. Hudson Type Locomotive on N. Y. C. Ry. Mech. Engr., vol. 101, no. 3, Mar. 1927, pp. 138–141, 6 figs. First 4–6–4 type is designed for heavy, fast-passenger service; built by American Locomotive Co.

New Hudson Type Locomotive of the New York Central. Ry. & Locomotive Eng., vol. 40, no. 3, Mar. 1927, pp. 72–73, 2 figs. First of 4–6–4 wheel arrangement is for heavy fast passenger service.

Internal-Combustion. Internal-Combustion Locomotives, E. K. Clark. Engineer, vol. 143, nos. 3718 and 3719, Apr. 15 and 22, 1927, pp. 410–411 and 445–448, 11 figs. Details of Still system with its unique combination of internal combustion and steam power; engine is double acting with internal combustion at one end of cylinder and steam at other end through which piston rod works; locomotive has three coupled axles and is destined to undertake most ordinary regular work on main-line service. Paper read before Instn. Mech. Engrs.

Internal-Combustion Boilers. The Internal-Combustion Boiler and the Locomotive. Ry. Engr., vol. 48, no. 566, Mar. 1927, p. 97. Operation of internal-combustion boiler; claims in regard to locomotive application; besides being able to reduce fuel consumption by 50 per cent and retaining reciprocating steam engine, many further advantages are obtained in using submerged flames for generating steam.

Mountain-Type. Mountain Type Express Locomotives, Northern of Spain Railway. Ry. Engr., vol. 48, no. 567, Apr. 1927, pp. 143–150, 15 figs. Exceptionally large and powerful 4–8–2 superheated 4-cylinder compound engines.

Packings. Locomotive Packings. Ry. Engr., vol. 48, no. 567, Apr. 1927, pp. 158–159, 3 figs. Details of new metallic segmental type of proved efficiency.

Performance. Locomotive Performance and Its Influence on Modern Practice, E. C. Poultney. Ry. Engr., vol. 48, no. 567, Apr. 1927, pp. 132–134, 5 figs. Problem which locomotive designers are seeking to solve is best means for ensuring reduction in certain losses of available power which will result in production in form of work at tender drawbar of greater percentage of heat energy in fuel fired, without increase of upkeep charges; losses referred to are (1) low indicated tractive effort for any given boiler; (2) low boiler output for given engine conditions (affected by proportions of tube length to diameter, combustion, air supply, etc.); (3) machine friction; (4) high proportion of locomotive weight for given capacity; and (5) excessive rolling and head air resistances. Abstract of paper read before Instn. Locomotive Engrs.

Propellers. A Comparative Study of Different Methods of Propulsion, F. Corini. Int. Ry. Congress—Bul., vol. 9, no. 3, Mar. 1927, pp. 187–192, 2 figs. Presents example to show that, for land transport over steep grades propeller has advantage over driving wheels; this is most important result, for it may lead to radical change in methods of working lines in mountain districts; of still greater importance is application of propellers to land transport over grades too severe for adhesion lines; if propeller is substituted for driving wheels, there is no limit to gradient which may be ascended; such a system of propulsion could be adopted in place of that used on funicular railways; problem of security remains to be solved, that is, stopping of vehicles on inclined plane in case of motor failing.

Steam-Turbine. Turbine Locomotive of the German Railways. Eng. Progress, vol. 8, no. 3, Mar. 1927, pp. 79–82, 6 figs. New Maffei express turbine locomotive with boiler pressure of 22 atmos.; surface condensation with sprinkler recooling on tender; auxiliary machines needed for purpose; action of condenser.

Superheated and Saturated Steam. Comparative Tests on Superheated and Saturated Steam Locomotives for Light Railways, F. Hübener. A.E.G. Progress, vol. 2, no. 8, Aug. 1926, pp. 196–200, 5 figs. Results of comparative trial runs carried out on superheated tender locomotives supplied by A.E.G., and saturated-steam locomotives already in service on German railway.

Superheated-Steam. An E-Type Narrow Gauge Superheated Steam Tender Locomotive, Silesian Light Railway Co., R. Opitz. A.E.G. Progress, vol. 2, no. 8, Aug. 1926, pp. 194–196, 3 figs. Locomotives built by A.E.G. for haulage of heavy freight trains.

Conversion of Saturated-Steam to Superheated-Steam Locomotives (Erfahrungen mit in Heissdampflokomotiven umgebauten Nassdampflokomotiven), M. Widdecke. Organ für die Fortschritte des Eisenbahnwesens, vol. 82, no. 3, Feb. 15, 1927, pp. 44–48, 6 figs. Account of author's experience in reconstruction of locomotives, with suggestions for elimination of all danger of failures.

Valve Gears. The Caprotti Poppet Valve Gear, A. Caprotti. Ry. Mech. Engr., vol. 101, no. 3, Mar. 1927, pp. 142–145, 6 figs. Description of application to 4-cylinder compound locomotive by Italian State Railways.

Wiesinger. Development of High-Duty Wiesinger Locomotive (Die Entwicklung der Hochleistungslokomotive Bauart Wiesinger), K. Wiesinger. Glasers Annalen, vol. 50, no. 5, Mar. 1, 1927, pp. 69–78, 12 figs. Principles underlying locomotive designs developed by author include considerable but not extreme extension of heat drop simultaneously in both upward and downward direction, high-speed, single-acting uniflow steam engine, direct heat admission to high-pressure boiler, and light construction; high-pressure exhaust and high-pressure condenser locomotives; experimental locomotive; heat balance.

LUBRICANTS

Economic Use of. Economic Use of Lubricants in Machine Shops (Aufwendungen für Schmiermittel und Möglichkeiten ihrer Verringerung in Maschinenfabriken), K. Seyderhelm. Maschinenbau, vol. 6, no. 5, Mar. 10, 1927, pp. 219–220, 1 fig. Gives examples of wasteful use of lubricants in machine shops, and discusses possibilities of effecting economies through constructional improvements and supervision.

Greases. Lubricating Greases and Soluble Oils, A. Seton. Machy. (Lond.), vol. 29, no. 754, Mar. 2, 1927, pp. 805–806. Requisites for good grease for lubrication are (1) freedom from acidity, particularly due to mineral acid; (2) mineral matter very low, and not of abrasive character; (3) viscosity well maintained and constituents not separating when grease melts.

LUBRICATING OILS

Behavior in Use. The Change in Lubricating Oils in Use (Veränderung der Schmieröle im Gebrauch), F. Frank. Maschinenbau, vol. 6, no. 5, Mar. 10, 1927, pp. 231–234, 1 fig. Lubricating process; disintegrating elements of oils; asphaltic materials; formation of acetic and formic acids; action of oxygen and of metals; injurious effect of dust; cylinder lubrication; points out necessity of close coöperation between engineer and chemist.

Economical Use. Economy in Use of Lubricating Oils (Einiges über rationelle Oelwirtschaft), Typke. Maschinenbau, vol. 6, no. 5, Mar. 10, 1927, pp. 216–219. Points out that elimination of unsuitable lubricants, choice of proper lubricating devices and bearings, proper application and care of oil while in use and recovery and re-utilization of used oils are means of aiding in conservation of lubricant.

Selection. Modern Aspects in Selection of Lubricating Oils (Moderne Gesichtspunkte für die Oelauswahl), S. Kiesskalt. Maschinenbau, vol. 6, no. 5, Mar. 10, 1927, pp. 230–231, 1 fig. Under otherwise equal conditions, it is advisable to select oils with flat temperature-viscosity curves for reasons of safety in operation and because of their good wearing qualities.

Study of. A Study of Petroleum Lubricants, C. F. Mabery. Indus. & Eng. Chem., vol. 19, no. 4, Apr. 1927, pp. 526–529. Two oils subjected to heavy use, one on truck and one on airplane, were examined as to specific gravity, viscosity, and behavior on frictional bearing; used oils were found to have undergone little deterioration; oils with same viscosity showed wide variation in frinctional tests; series of medium-grade lubricants, viscosity 320 seconds at 38 deg. cent., gave maximum difference of 12 seconds at 98 deg. cent., of 27 seconds at 54.4 deg. cent., and corresponding differences in results on frictional bearing.

LUBRICATION

Machine Tools. Automatic Lubrication in the Machine Tool Industry. Lubrication, vol. 13, no. 3, Mar. 1927, pp. 25–36, 20 figs. Systems of lubrication; essentials of pressure lubrication; grease lubrication; gearing; bearings, guides, and slides; drills and boring mills.

Mechanical System. Farmer Lubricating System. Am. Mach., vol. 66, no. 12, Mar. 24, 1927, pp. 511–512, 3 figs. Mechanical lubricating system designed for positive lubrication of machine parts with solidified transmission oil from centrally controlled point.

Problems. Lubrication, W. R. Ormandy. Engineering, vol. 123, no. 3194, Apr. 1, 1927, pp. 403–404. New discoveries relating to chemistry of atom and molecule as bearing on problem of lubrication; unimolecular character of surface films; surface energy of

solids; spreading on solid surfaces; volatility and flash-point; resistance to oxidization. Paper read at joint mtg. of Instn. Mech. Engrs. and Soc. Chem. Industry. See also Engineer, vol. 143, nos. 3716 and 3717, Apr. 1 and 8, 1927, pp. 361–362 and 393–394, 4 figs.

Technique. The Technique of Lubrication (Die Kernpunkte der wissenschaftlichen Schmiertechnik), E. Falz. Machinenbau, vol. 6, no. 5, Mar. 10, 1927, pp. 213–216. Nature of fluid friction and its importance; influence of coefficient of bearing friction; lubrication systems and materials; oil filtration and bearing metal; points out that practical results confirm scientific principles.

M

MACHINE TOOLS

Electric Drive. Designs Simplified by Electrical Means, H. L. Blood. Machy. (N. Y.), vol. 33, nos. 7 and 8, Mar. and Apr. 1927, pp. 481–484 and 585–589, 12 figs. Examples of simplification of machinery by use of motor drives and electrical controlling apparatus.

Lubrication. Machine-Tool Lubricating Systems, E. P. Blanchard. Am. Mach., vol. 66, no. 15, Apr. 14, 1927, pp. 607–608, 3 figs. Indication of what comprises satisfactory system and what forms basis for judging comparative methods; survey of recent installations made by machinery builder.

Modern. Modern Machine Tool, H. Rowland. Can. Machy., vol. 37, no. 12, Mar. 24, 1927, pp. 15–17, 7 figs. Modern machine tools are equipped with better control, can take heavier cuts, give more accurate work with less effort, in fact, make it possible to employ cheaper labor where desirable.

Semi-Special. Using More Semi-Special Tools, F. B. Heitkamp. Iron Age, vol. 119, no. 15, Apr. 14, 1927, pp. 1072–1074, 5 figs. Tendency in automotive field is toward use of modified standard machines rather than tools entirely special in design.

Speed Standardization. Speed Standardization in Design of Machine Tools (Die Drehzahlnormung im Werkzeugmaschinenbau), R. Panzer. Werkstattstechnik, vol. 21, no. 3, Feb. 1, 1927, pp. 73–80, 14 figs. Author calls attention to multiplicity of speeds of standard machine tools and disadvantages accruing therefrom; points out advantages to producer and user of use of general standard speed series; discusses four main points of speed series.

T-Slot Standardization. Work Completed on T-Slot Standardization. Mech. Eng., vol. 49, no. 4, Apr. 1927, p. 381, 3 figs. Details of new standards.

MACHINING METHODS

Knurling. Knurling for Light Press Fits, J. K. Olsen. Machy. (N. Y.), vol. 33, no. 8, Apr. 1927, pp. 573–576, 7 figs. Application of knurled bearing surfaces in assembling parts of small mechanisms.

MAGNESIUM ALLOYS

Melting and Casting. Melting and Casting of Magnesium Alloys (Das Schmelzen und Vergiessen von Magnesiumlegierungen), H. Reininger. Giesserei, vol. 14, nos. 2 and 12, Jan. 8 and Mar. 19, 1927, pp. 17–21 and 182–190, 53 figs. Review of developments in use of magnesium alloys, with special reference to electron metals; melting and casting methods. Mar. 19: Melting equipment; economy of different melting processes and plants; casting of magnesium alloys; methods and equipment.

MALLEABLE CASTINGS

Black-Heart. The Cupola and Black-Heart Malleable (Le cubilot et la malléable à coeur noir; sa pratique), C. Kluystmans. Fonderie Moderne, vol. 21, Feb. 1927, pp. 45–51. Deals with cupola process in melting pig which is to be annealed for obtaining black-heart malleable; air volume, pressure and calculation of charge; temperature and composition; points out that black-heart malleable can be produced at lower price in cupola than in reverberatory furnace.

MATERIALS HANDLING

Industrial Plants. Transport in the Engineering Works, H. Bentley. Indus. Mgmt. (Lond.), vol. 14, no. 4, Apr. 1927, pp. 135–136. Points out that introduction of well-planned runway or truck system means elimination of considerable amount of waste time in plant; electric vehicles and traveling cranes; mobility of electric truck and platform truck.

Lime Industry. Materials Handling Methods in the Lime Industry, E. J. Tournier. Indus. Mgmt. (N. Y.), vol. 73, no. 3, Mar. 1927, pp. 151–154, 6 figs. Analysis shows that in most cases regular manufacturing schedule can be established; in author's opinion, there is no reason why lime plant cannot be made a factory, producing regular output with minimum of hand labor; examples of economies effected by introduction of machinery to reduce labor costs.

Pneumatic. Recent Developments in the Pneumatic Handling, E. J. Tournier. Indus. Mgmt. (N. Y.), vol. 73, no. 4, Apr. 1927, pp. 205–209, 6 figs. Construction and operation of newer types of pneumatic conveyors.

METALS

Corrosion Fatigue. Stress-Strain-Cycle Relationship and Corrosion-Fatigue of Metals, D. J. McAdam, Jr. Am. Soc. Testing Matls.—Proc., vol. 26, part 2, 1926, 40 pp., 12 figs. Material and methods of investigation; following subjects are considered; stress-cycle graph extended to nominal stresses well above tensile strength of material and over range from less than 1000 to more than 100,000,000 cycles; interrelationship between stress-cycle, stress-deflection and deflection-cycle graphs; effect of cyclic repetition on deflection and hysteresis; stress-cycle graph as affected by cycle frequency, thermal conductivity of specimen and environment, and form of specimen; extrapolation of stress-cycle graphs; evidence is presented that very slight corrosion when simultaneous with fatigue causes low resistance to fatigue; damaging effect is greater the harder the steel; advantage of heat treatment may thus be practically neutralized; ratios of "corrosion-fatigue" limits to endurance limit are compared with other physical properties of steel; practical importance of corrosion fatigue for ferrous and non-ferrous metals.

Fatigue. Some Modern Views on the Fatigue of Metals, H. J. Gough. Structural Engr., vol. 5, no. 3, Mar. 1927, pp. 70–81 and (discussion) 81–83, 7 figs. Attrition theory of Ewing and Humfrey; Bauschinger's theory of natural range of elastic limits; stress-strain relations under safe range and under unsafe range of stress; quasi-elasticity or elastic hysteresis; effect of slip caused by stress concentrations; effects of static and repeated stresses on microstructure of metals; theory of strain hardening governing behavior of metals under static and repeated stresses. Bibliography.

Grain Growth. Relation of Surface to Volume in Crystals as a Determining Factor in Grain Growth of Metals, G. W. Walker. Am. Soc. Steel Treating—Trans., vol. 11, no. 4, Apr. 1927, pp. 619–625. Attempt is made to obtain more critical view of mechanism involved in grain growth of metals taking into consideration physical factors; surface, volume, surface tension, surface energy, solubility, boundary migration, etc.; attempt is also made to consider these phenomena in quantitative aspect as far as data is available.

Heat- and Acid-Resisting. Heat- and Acid-Resisting Materials (Hitze- und säurebeständige Konstruktionsstoffe), B. Schulz. Brennstoff- u. Wärmewirtschaft, vol. 9, no. 3, Feb. 1, 1927, pp. 62–65, 2 figs. Discusses progress made in solution of this problem before and during World War, and recent post-war investigations and experimental results.

Superheated Steam, Effect of. Why Metals Fail Under Influence of Steam Once Superheated, B. Houghton and D. C. Weeks. Power, vol. 65, no. 15, Apr. 12, 1927, pp. 540–542, 7 figs. Presents deductions on cause of metal failures from observations extending over a period of 30 years of power-plant practice combines with recent observations of nature of superheated steam as produced in modern power plants.

Tensile Test. The Tensile Test—Some Less Well-Known Features, G. Sachs. Metallurgist (Supp. to Engineer), Mar. 25, 1927, pp. 44–46, 8 figs. Tensile stress as plotted in conventional load-extension diagram is only nominal, actual or true stress at any point being greater in proportion to decrease in cross-section of test piece; true stress increases from beginning to end of test; maximum load occurs at commencement of local necking of specimen; tests show that for mild steel, copper and aluminum, order of occurrence of phenomena is (1) local necking, (2) maximum load, (3) end of uniform elongation; in practice it is found that effect of local necking extends for some distance, diameter of test piece gradually increasing from point of fracture; nor can end effect be neglected for materials having large extension; accurate determination of uniform elongation can in such cases only be made on long bars. Translated from Berichte der Fachausschlüsse des Vereins deutscher Eisenhüttenleute.

MICROSCOPES

Universal Measuring. Universal Measuring Microscope. Machy. (Lond.), vol. 29, no. 752, Mar. 10, 1927, p. 753, 3 figs. Latest addition to range of Schuchardt & Schütte Zeiss fine measuring tools; wide range of application includes accurate measurement of screw threads by aid of straight edges applied to tooth profile on axial plane of thread.

MILLING

Automobile Components. Modern Milling Practice. Automobile Engr., vol. 17, no. 226, Mar. 1927, pp. 103–105, 8 figs. Typical quantity-production methods for automobile components.

Railway Shops. Milling Practice in a Railroad Shop. Machy. (N. Y.), vol. 33, no. 8, Apr. 1927, pp. 598–600, 5 figs. Methods used by one of New York Central Shops in keeping locomotives fit for service.

MILLING MACHINES

Cam. Bilton Automatic Cam Milling Machine. Machy. (N. Y.), vol. 33, no. 8, Apr. 1927, pp. 625–626, 2 figs. Cams for automobile 4-wheel brake mechanisms are produced at rate of 80 per hour in machine which is special adaptation of no. 3$^1/_2$ "Producto-Matic" which automatically mills cams to desired outline and stops when each operation is completed.

Standardized Spindle End. Announce Standardized Spindle End. Iron Age, vol. 119, no. 13, Mar. 31, 1927, pp. 930–931 and 978, 6 figs. Milling-machine manufacturers adopt common design, which promises economies for users; complete set of new arbors developed. See also Iron Trade Rev., vol. 80, no. 13, Mar. 31, 1927, pp. 821–823, 5 figs., and Am. Mach., vol. 66, no. 13, Mar. 31, 1927, pp. 517–521, 10 figs.

Standardized Arbors for Milling Machines. Machy. (N. Y.), vol. 33, no. 8, Apr. 1927, p. 576A, 3 figs. Standard adopted by Milling Machine Manufacturers of National Machine Tool Builders' Association.

MOTOR-BUS TRANSPORTATION

Coördination with Railways. Pacific Electric Coördinates Rail and Bus Service. Ry. Age, vol. 82, no. 17, Mar. 26, 1927, pp. 1021–1023, 5 figs. Railway organization handles operation and maintenance of 114 coaches which have replaced train service.

Fields for. Fields for Motorcoach Operation, R. N. Graham. Soc. Automotive Engrs.—Jl., vol. 20, no. 4, Apr. 1927, pp. 489–497, 6 figs. and (discussion) 497–501. Definition of fields for profitable operation of motor coaches is undertaken by author on basis of personal experience in concurrent operation of motor coaches and street railways during last 5 years; fields in which motor coaches can be operated profitably are specified, and author advocates special supplemental service for which relatively high rate of fare may be charged for comfortable express ride from suburbs into heart of city.

MOTOR BUSES

All-Metal. All-Metal Omnibus Bodies. Motor Transport, vol. 44, no. 1149, Mar. 21, 1927, pp. 343–345, 7 figs. Progress made by Short Bros. with novel construction of light alloys; extreme lightness combined with strength.

Maintenance. Motorcoach Maintenance Methods, H. L. Debbink. Soc. Automotive Engrs.—Jl., vol. 20, no. 4, Apr. 1927, pp. 454–456 and (discussion) 456–459. Describes progressive changes in inspection and overhaul system that finally developed into present system of regular inspections at intervals of 1000 miles of operation, which include inspection of parts that give most frequent trouble, draining of crankcase oil, and greasing of chassis; general and more thorough inspection after each 4000 miles; and general overhaul of chassis and body at intervals that average 30,000 miles; 1000-mile inspection is made between runs or at night and does not interfere with regular operation of motor coaches.

Testing. Major Testing by Electricity. Bus Transportation, vol. 6, no. 4, Apr. 1927, pp. 191–194, 10 figs. Tire life, brake adjustment, trouble shooting and performance measurements made of engine or complete vehicle, with dynamometer outfit now being introduced in operating garages.

MOTOR TRUCKS

Military. The Development of Mechanical Vehicles for General Load-Carrying Duty in the Army, C. H. Kuhne. Engineer, vol. 143, nos. 3714 and 3715, Mar. 18 and 25, 1927, pp. 306–308 and 332–335, 19 figs. Outline of past evolution and indication of circumstances; W. D. rigid-frame 6-wheeled vehicle; comparative constructional performance features of various types of general-service load-carrying vehicles. Paper read before Instn. Mech. Engrs. See also Engineering, vol. 123, nos. 3192 and 3193, Mar. 18 and 25, pp. 336–340 and 367–370, 19 figs; and Automobile Engr., vol. 17, no. 227, Apr. 1927, pp. 135–139, 12 figs.

Six-Wheeled. The Six-Wheeled Crossley. Motor Transport, vol. 44, no. 1149, Mar. 21, 1927, pp. 353–355, 5 figs. Rigid framed chassis built to meet military requirements for medium class, carrying loads of 2 tons across country and 3 tons on roads.

N

NON-FERROUS METALS

Temperature Determination. Judging Temperature by Sight, R. R. Clarke. Can. Foundryman, vol. 18, no. 3, Mar. 1927, pp. 5–6. Appearance of various non-ferrous metals at various temperatures is discussed, and practical information given to enable molder to judge actual temperature of metal under widely varying conditions.

NOZZLES

Discharge. The Coefficient of Discharge of Nozzles (Note sur le coefficient de débit des tuyères), A. Schlag. Revue Universelle des Mines, vol. 13, no. 2, Jan. 15, 1927, pp. 64–74, 6 figs. Investigation carried out in order to determine accurately coefficient of discharge; conclusions reached by Rateau, Leroux and Bourgeat; gives method sufficiently accurate for calculating friction loss in nozzle.

O

OIL ENGINES

Fuel Measurer. Notes on the Running of Oil Engines and Description of the "Powbal" Fuel Measurer, E. Wood. Inst. Mar. Engrs.—Trans., vol. 39, Feb. 1927, pp. 53–65, 2 figs. Author seeks to show main reasons why excessive wear takes place in majority of oil engines and how many of operating troubles frequently experienced may be avoided; describes Powbal fuel measurer, object of which is to measure quickly, accurately and register clearly exact quantity of fuel oil discharged by each and every stroke of oil-engine fuel pumps; with this apparatus, it is claimed that power output of six-cylinder engine can be equalized in various cylinders in few minutes.

High-Speed. A 120-B.H.P. High-Speed Oil Engine. Mech. World, vol. 81, no. 2099, Mar. 25, 1927, pp. 215–216, 3 figs. Oil engine built by A. G. Mumford, Colchester, designed primarily for motor-boat service, but quite suitable for service on land.

Fundamentals of High Speed Oil Engine Design, H. F. Shepherd. Power Plant Eng., vol. 31, no. 7, Apr. 1, 1927, pp. 409–411, 3 figs. Design features resulting from three years' research; importance of good workmanship and good metals brought out by service tests.

OPEN-HEARTH FURNACES

Basic Practice. Basic Open-Hearth Practice, C. H. Herty, Jr. Am. Soc. Steel Treating—Trans., vol. 11, no. 4, Apr. 1927, pp. 569–582. Open-hearth practice for three types of charges are compared,

three heats of steel being used for comparison; first two are pig iron and scrap heats with no ore in charge, first of these charged with very large scrap, second with medium scrap; third heat is iron-ore heat, 20,000 lb. of ore being charged with scrap; comparison covers melting period, lime boil, working period and efficiency of deoxidizers used; effect of sulphur in gas on sulphur content of metal.

Refractories. Factors Affecting Open Hearth Refractories, B. M. Larsen and A. Grodner. Blast Furnace & Steel Plant, vol. 15, no. 4, Apr. 1927, pp. 161–164, 10 figs. Certain relations between refractories service, insulation, and flow of heat in open-hearth furnace; investigation conducted under operating conditions.

OXYACETYLENE WELDING

Steel Castings. How Steel Castings are Oxwelded. Oxy-Acetylene Tips, vol. 5, no. 9, Apr. 1927, pp. 164–165, 1 fig. Preparation for welding; preheating is usually necessary; welding technique; annealing.

P

PLANERS

Power Required for Drive. Power Required for Planing. Am. Mach., vol. 66, no. 13, Mar. 31, 1927, p. 543. Table for calculating power required for making cuts on planers. Reference-book sheet.

PLATES

Elastic Deflection. Elastic Deflection of Thick Plates Uniformly Loaded, G. M. Russell. Engineering, vol. 123, no. 3193 and 3194, Mar. 25, 1927, pp. 343–345 and 407–408, 13 figs. Results of investigations which were outcome of preliminary considerations regarding use of such plates as measuring springs for study of rapidly changing high pressures, such as occur in ballistic work.

POLISHING MACHINES

Centerless-Feed. Production Machine Co. Type S Centerless-Feed Polishing Machine. Am. Mach., vol. 66, no. 13, Mar. 31, 1927, p. 559, 3 figs. Belt can be adjusted to run in either vertical or horizontal position, and taper spindle is also provided for miscellaneous internal work, such as finger holes in scissors and similar purposes.

PRESSES

Blanking. Making Two and One-Half Million Blanks Every Day, E. Sheldon. Am. Mach., vol. 66, nos. 10 and 12, Mar. 10 and 24, 1927, pp. 399–401 and 489–491, 7 figs. Mar. 10: Enormous production of safety-razor blades entails special methods and machines; each press blanks 700 blades per min.; taking care of scrap. Mar. 24: Subpresses, equipped with duplicate sets of tools, blank two blades at once; arrangement and operation of punches and dies.

Cold. The Relation of Temperatures in Cold Presses to Speed of Deformation (Die Abhängigkeit der Temperaturen in Kaltpressen von der Verformungsgeschwindigkeit), O. Föppl. Maschinenbau, vol. 6, no. 1, Jan. 6, 1927, pp. 22–24, 2 figs. Results of test to determine temperatures resulting from pressing of wire tacks; experiments were carried out with aid of thermocouples; contrary to assumption frequently found in literature, temperature increase bears no relation to speed of deformation.

Multi-Stage. Modern Multi-Stage Presses and Economic Mass Production of Drawn Products (Neuzeitliche Stufenpressen und Wirtschaftliche Fertigung gezogener Massenartikel), R. Hummel. Werkstattstechnik, vol. 20, no. 24, Dec. 15, 1926, pp. 729–732, 5 figs. Discusses useful possibilities of multi-stage presses; comparative calculation of old and new methods; material-feed equipment and auxiliary machines for economic stamping out of disks.

PRESSWORK

Metal Aircraft Pressings. A Low-Cost Method of Producing Metal Aircraft Pressings, R. D. Weyerbacher. Automotive Industries, vol. 56, no. 15, Apr. 16, 1927, pp. 586–587, 7 figs. Navy uses single die with sheet rubber in lieu of second matched die in working out quantity-production system.

PRINTING MACHINERY

Presses, Electric Drive. Problems Encountered in Electric Drives of Printing Presses (Nagra problem vid elektrisk drift av tryckpressar), C. Kiessling. Teknisk Tidskrift (Elektroteknik), vol. 57, no. 1, Jan. 8, 1927, pp. 14–17, 7 figs. Describes certain types of electrical equipment which have become common in drives for printing presses; requirements peculiar to these installations arise in connection with necessity for two widely different speed ranges, one for adjustment of paper at beginning of roll and another for normal operation; operation must be stable for both of these ranges, and automatic control must provide for smooth variation from lower speed into higher.

PSYCHOLOGICAL TESTS

Hand-Writing Tests. Hand Writing as Aid in Character Testing (Handschrift-Charakter-Eignung), M. Zscheile. Werkstattstechnik, vol. 21, nos. 1 and 2, Jan. 1 and 15, 1927, pp. 1–8 and 38–49. Points out that hand writing gives means of determining moral qualities of prospective employees; presents tables showing fundamentals of hand-writing interpretations; usefulness of this science is demonstrated.

PULVERIZED COAL

Boiler Firing. What Must Steam-Boiler Owner Know of Pulverized-Coal Firing? (Was muss der Dampfkesselbesitzer von der Kohlenstaubfeuerung wissen?), F. Schulte. Zeit. des Bayerischen Revisions-Vereins, vol. 31, nos. 4 and 5, Feb. 28 and Mar. 15, 1927, pp. 34–38 and 48–50. After reviewing advantages and disadvantages of pulverized-coal firing, author discusses preparation, with special regard to selection of mills, describing different types of mills; suggestions for furnace operation and selection of refractories; different types of boilers and their adaptability to pulverized-coal firing. Mar. 15: Adaptability of different varieties of coal; economy and danger of explosion. Bibliography.

Steam Power Plants. Power Plant Trend Toward Lower Costs, A. Murphy. Power House, vol. 21, no. 6, Mar. 20, 1927, pp. 33–35, 5 figs. Pulverized-fuel systems finding favor in many of Dominion's larger industrial plants, although majority of installations have been operating too short a time to permit thorough analysis of costs being made.

Unit Mills. Recent Developments in Coal Burning. Power, vol. 65, no. 13, Mar. 29, 1927, pp. 476–479. Possibilities of unit mill and difficulties of burning Illinois coal as compared to high-grade eastern coals; advantages of unit mill contrasted with those of bin and storage system.

PUMPING STATIONS

Daily Log Data. Essential Daily Log Data in the Pumping Station, I. S. Walker. Am. Water Works Assn.—Jl., vol. 17, no. 3, Mar. 1927, pp. 351–355. Deals only with operations of steam operated pumping station.

PUMPS

Air Lifts. Practical Installation of the Air Lift, H. T. Abrams. Power Plant Eng., vol. 31, no. 8, Apr. 15, 1927, p. 457, 1 fig. Pipes should be submerged to certain depth, proportionate to lift when pump is at work; necessity of proper ratio of submergence to lift is important and is governing factor in design of such a pump.

PUMPS, CENTRIFUGAL

Characteristics. Centrifugal Pumps and Their Characteristics, G. Lee. Indus. Mgmt. (N. Y.), vol. 73, no. 3, Mar. 1927, pp. 188–192, 13 figs. Features of design influencing selection and application.

Electrically Driven. Cost of Operating Motor Driven Centrifugal Pumps at McKeesport, Pennsylvania, L. Hudson and A. J. Richards. Am. Water Works Assn.—Jl., vol. 17, no. 3, Mar. 1927, pp. 356–364. Fixed charges on cost of plant; man-power cost; cost of oil, waste and incidental miscellaneous supplies.

Thrust and Leakage. Eliminating Thrust and Leakage in Centrifugal Pumps, J. J. Conway. Power Plant Eng., vol. 31, no. 7, Apr. 1, 1927, pp. 402–403. Adjustable wearing rings and thrust bearings are needed to keep up best efficiency.

PUNCHING MACHINES

Design. Practical Punching Machine (Praktische Lochwerke), F. Puppe. V.D.I. Zeit., vol. 71, no. 10, Mar. 5, 1927, pp. 314–316, 11 figs. Describes punching machines for machining large and small plates, and improved design for production of multiple-hole plates.

R

RADIATORS

Heat Transmission. Heat-Transmission and the Motor-Car Radiator, W. E. Dalby. Instn. Civ. Engrs.—Sessional Notices, no. 3, Mar. 1927, pp. 65–66. Investigates problem of heat transmission across wind-swept cooling surface, with particular application to automobile radiator and locomotive air-cooled radiator; main problem was to find how to relate performance of radiator tested naked in wind channel with performance of same radiator in car driven along road. (Abstract.)

RAILS

Flaw Detection. Detecting Hidden Flaws in Rails. Iron Age, vol. 119, no. 15, Apr. 14, 1927, p. 1059. Magnetizing device, developed in Japan, claimed capable of locating flaws, fissures, segregation and other defects in rolled sections.

Joints, Welded. Progress Report Number Four Repeated Impact Tests. Committee on Welded Rail Joints, Am. Bur. Welding, Am. Elec. Ry. Eng. Assn., July 1926, 35 pp., 20 figs. Deals with cast-iron, electric resistance (bar and butt), electric seam, and thermit welded joints; relation of American Electric Railway Engineering Association to Committee; repeated impact tests of welded rail joints; explanation of charts showing progressive failure of joints under repeated impact tests; report of subcommittee on inspection of fractured joints; Bureau of Standards metallographic report; discussion in impact testing.

RAILWAY MANAGEMENT

Stocks Simplification. C. & O. Profits From Simpler Stocks and Better Planning. Ry. Age, vol. 82, no. 16, Mar. 19, 1927, pp. 941–945, 6 figs. 22,000 items of stock eliminated by systematic studies; new control methods adopted.

RAILWAY MOTOR CARS

Gasoline-Electric. Gas-Electric Cars on the D. T. & I. Ry. Mech. Engr., vol. 101, no. 3, Mar. 1927, pp. 146–148, 6 figs. Two 150-hp. Hall-Scott engines, with Westinghouse generators, are carried under car floor.

Mechanical Drive. Frisco Gets Mechanical Drive Gasoline Rail Cars. Ry. Age, vol. 82, no. 17, Mar. 26, 1927, pp. 983–984, 2 figs. Two 275-hp. Sykes cars placed in service on 205-mile daily run in Oklahoma.

Storage-Battery. Electric Battery Rail Car. Ry. Gaz., vol. 46, no. 12, Mar. 25, 1927, pp. 406–407, 1 fig. Designed particularly to meet needs of light branch-line traffic.

RAILWAY REPAIR SHOPS

Accuracy Devices. Short-Cut and Accuracy Devices in a Railroad Shop, L. C. Morrow. Am. Mach., vol. 66, no. 14, Apr. 7, 1927, pp. 565–568, 13 figs. One of policies of repair shops of Oregon and Washington R. R., Albina, Ore., division of Union Pacific System, is to provide mechanical devices for sake of securing accuracy as well as saving time; examples of such devices.

Denver, Colo. Various Machine Set-Ups from a Denver Railroad Shop, F. W. Curtis. Am. Mach., vol. 66, no. 13, Mar. 31, 1927, pp. 533–535, 8 figs. Shaping binders; machining driving boxes; grinding air-pump cylinders; milling forked rods; face-grinding links; hydraulic press for driving-box work; chuck for boring and turning tires.

RAILWAY SIGNALING

Automatic Block. Automatic Electric A. C. System (Selbsttätige Signalanlagen), Roudolf. Organ für die Fortschritte des Eisenbahnwesens, vol. 82, no. 3, Feb. 15, 1927, pp. 48–52. Automatic signaling with alternating current; connection of automatic block sections; light signals.

The Installation of Automatic Block Signals on Railways in Netherland (De inrichting van automatisch blokstelsel bij de Nederlandsche Spoorwegen), J. H. Verstegen. Ingenieur, vol. 42, no. 13, Mar. 26, 1927, pp. 237–250 and (discussion) 250–257, 35 figs. Details of installations.

Colored-Light Signals. C. & O. Completes Three-Track, Color-Light, Either-Direction Signaling, B. T. Anderson. Ry. Signaling, vol. 20, no. 4, Apr. 1927, pp. 133–138, 12 figs. Also Ry. Age, vol. 82, no. 16, Mar. 19, 1927, pp. 950–953, 7 figs. Simplified scheme of indications with traffic locking and 5 new interlockers eliminates written train orders, increasing safety and speed of operation.

Chicago South Shore & South Bend Changes Signal Equipment, B. L. Smith. Ry. Signaling, vol. 20, no. 4, Apr. 1927, pp. 130–132, 8 figs. Union model-R color-light signals replace upper-quadrant semaphores; high-speed spring switches installed at passing tracks.

Lever-Operated Switch. Lever Operated Switch for Use with Cab Signalling Ramps on Single Lines. Int. Ry. Congress—Bul., vol. 9, no. 3, Mar. 1927, pp. 267–269, 2 figs. French Government requires principal railway companies to fit locomotives with cab signals for repeating all signals and semaphores; cab signal uniformly adopted is operated by metal brush carried on engines, when passing signal, making contact with fixed insulated conductor in form of ramp in middle of track. Translated from French.

Trains in Motion. The Transmission of Signals on Moving Trains (Die Uebertragung von Signalen auf fahrende Züge), O. Roudolf. Elektrotechnische Zeit., vol. 48, no. 6, Feb. 10, 1927, pp. 164–167, 12 figs. Deals with automatic train control; such mechanical equipment are only applicable for railway lines with low speed, for example, subways; for trunk lines with high average speed, apparatus must be employed which work electromagnetically or by wireless methods, such as here described.

RAYON

Industry. Artificial Silk. Times Trade & Eng. Supp. (Artificial Silk Number), vol. 20, no. 456, Apr. 2, 1927, pp. 1–32, 74 figs. This special number contains following contributions: Outlook, S. Courtauld. Review of Industry in Canada, Germany, Spain, Holland, France, Italy, United States, Belgium, Japan, Switzerland, Czechoslovakia, etc.; Developments in Manufacture, W. P. Dreaper; Stable Fibers, E. Midgley; Acetate Silk, A. J. Hall; Artificial Hair, D. Hunter; Dress Fabrics, H. Jackson; Pulp Supplies, G. W. Andrews; Dyestuffs, R. S., Horsfall; German Machinery Industry, H. Jentgen; Yarn Characteristics; World's Markets; complete table of British exports in 1925 and 1926, etc.

REFRIGERATING MACHINES

CO_2 Compressors. Some Problems in the Application of Direct Connected Synchronous Motors to Carbon Dioxide Compressors, D. W. McLenegan. Refrig. Eng., vol. 13, no. 7, Jan. 1927, pp. 220–229, 14 figs. Torque and flywheel requirements.

REFRIGERATION

Carbon-Dioxide. Pointers on Carbonic Refrigeration, H. J. Macintire. Power Plant Eng., vol. 31, no. 7, Apr. 1, 1927, pp. 422–423. Discussion of questions that arise to perplex new user of CO_2 refrigeration.

Gas. Operating Cost of Household Refrigeration by Gas, W. R. Hainsworth. Refrig. Eng., vol. 13, no. 8, Feb. 1927, pp. 245–247, 1 fig and (discussion) 247–248 and 252, 1 fig. Cost of energy alone has been considered; further advantage in operating cost of gas refrigeration system exists in possibilities of less service requirements and longer life.

ROLLING MILLS

Electric Drive. 1926 Developments in Electric Drive, A. F. Kenyon. Iron Age, vol. 119, no. 15, Apr. 14, 1927, pp. 1068–1071, 5 figs. Rolling-mill equipment underwent notable advances in control; large units multiplying rapidly.

Layout and Equipment. Rolls Wide Range of Products, R. A. Fiske. Iron Age, vol. 119, no. 13, Mar. 31, 1927, pp. 923–926, 6 figs. Mill at Wisconsin Steel Works is equipped to produce universal plates, structural shapes, rounds, squares and flats. See also description in Iron Trade Rev., vol. 80, no. 13, Mar. 31, 1927, pp. 832–834, 4 figs.

Mannesmann Process. Mannesmann Process (Das Schrägwalzen), F. Kochs. Stahl u. Eisen, vol. 47, no. 11, Mar. 17, 1927, pp. 433–446, 30 figs. Prin-

ciple of process; stresses in rolled material, mechanical and dynamic phenomena; magnitude, speed and direction of acting forces; twisting of ingot is unavoidable result; influence of mandrel on hole formation; tests, with aid of macroscopic and microscopic examinations, on deformation phenomena. Bibliography.

Sheet Mills. Sheet Mills (Das Feinblechwalzwerk), W. Krämer. Stahl u. Eisen, vol. 47, nos. 6, 9 and 10, Feb. 10, Mar. 3 and 10, 1927, pp. 209–219, 352–358 and 399–406, 42 figs. Discusses most important methods of producing sheet in cold and hot mills; details of such mills including those of plate heating furnace; comparison of German and American rolling methods; lubrication of bearings; heat treatment of sheet; suggestions for improvements in order to increase efficiency.

S

SAND, MOLDING

Reclamation. Restore Molding Sand Bond, W. F. Prince. Foundry, vol. 55, no. 6, Mar. 15, 1927, pp. 236–237. Recounts early experiences in attempting to reclaim foundry sand and states that many modern claims cannot be sustained.

SAWS

Cold. A New Cold Saw, U. Lohse. Eng. Progress, vol. 8, no. 3, Mar. 1927, pp. 77–78, 6 figs. Details of Mars metal saw for removing gates, risers and dead heads of large section from iron and steel castings.

Hack-Saw Blades. Standardizing Hack Saw Blades, R. Job. Ry. Mech. Engr., vol. 101, no. 3, Mar. 1927, pp. 169–71. Specifications based on simple shop tests leave chemical composition and heat treatment to discretion of manufacturer.

SCREW THREADS

Pitch-Measuring Machine. Société Genevoise Pitch-Measuring Machine. Am. Mach., vol. 66, no. 18, May 5, 1927, pp. 752–753, 2 figs. Apparatus for measurement of pitch of screw threads.

Tolerances. The Present Status of Thread Tolerances (Der jetzige Stand der Gewindetoleranzen), E. Schlobach. Maschinenbau, vol. 6, no. 1, Jan. 6, 1927, pp. 11–13, 6 figs. Discusses improvements made on German DIN standards.

SEAPLANES

Lioré and Olivier. Lioré and Olivier Seaplane, Type 194 (L'hydravion Lioré et Olivier, type 194), Aéronautique, vol. 9, no. 93, Feb. 1927, pp. 37–40, 5 figs. Details of plane equipped with Gnôme and Rhône Jupiter 420-hp. engines.

SEMI-STEEL

Properties. Semi-Steel, J. E. Hurst. Foundry Trade Jl., vol. 35, nos. 552 and 553, Mar. 17, and 24, 1927, pp. 231–232 and 257–258. Mar. 17: Composition, total carbon contents. Mar. 24: Industrial semi-steel; low total-carbon semi-steels; character of steel additions; soundness and regularity of final castings.

SHAFTS

Whirling Speed. Application of an Integral Equation to the Whirling Speeds of Shafts, R. C. J. Howland. Lond., Edinburg and Dublin Philosophical Mag. & Jl. of Sci., vol. 3, no. 15, Mar. 1927, pp. 513–528. Squares of whirling speeds of shaft are exhibited as characteristic numbers of homogeneous integral equation; approximate solutions are sought by applying approximation formulas to integral and whirling speeds are found as roots of determinantal equation.

SHAPERS

Railway. Heavy-Duty Railroad Shaper of Improved Design. Iron Age, vol. 119, no. 14, Apr. 7, 1927, pp. 1003–1004, 3 figs. Attachments provided for machining driving boxes, shoes and wedges, rod brasses, and other work on production basis.

SPEED REDUCERS

Continuous-Tooth Gears. Falk Speed Reducers. Am. Mach., vol. 66, no. 12, Mar. 24, 1927, p. 512, 1 fig. These units feature Falk continuous-tooth all-steel herringbone gears, said to be precision made, silent and of high efficiency.

Types and Applications. Speed Reducer Types and Their Application to Industrial Requirements. West. Machy. World, vol. 18, no. 3, Mar. 1927, pp. 112–115 and 137, 15 figs. Deals with different types of speed reducers most suitable and economical for various kinds of industrial service; common types are grouped into three classes; spur-grear, herringbone-gear and worm-gear speed reducers.

SPRINGS

Tempering and Resetting. Tempering and Resetting Springs, C. A. Kyle. Elec. Ry. Jl., vol. 69, no. 13, Mar. 26, 1927, pp. 576–577, 1 fig. Spring repairs are facilitated and cost of tempering and resetting springs reduced by spring-tempering furnace of gas-burning type installed in shops of New York State Railways, Syracuse, N. Y.

Testing and Scragging Machines. Spring Testing and Scragging Machines. Machy. (Lond.), vols. 28 and 29, nos. 727, 728, 729 and 737, Sept. 16, 23, 30 and Nov. 25, 1926, pp. 724–725, 754–756, 789–790 and 250–251, 18 figs. Describes various types of spring-testing machines.

STANDARDS

German DIN Reports. Report of German Industrial Standards Committee (DIN Mitteilungen). Maschinenbau, vol. 6, no. 2, Jan. 20, 1927, pp. 93–100, 4 figs. Proposed tentative standards for slide gages; spaces between typewriter keys and typewriter maintenance equipment; small motor fire engines; and pressure hose.

Report of German Industrial Standards Committee (DIN Mitteilungen). Maschinenbau, vol. 6, no. 5, Mar. 10, 1927, pp. 253–264, 10 figs. Gives list of recently published standard sheets; proposed standards for grinding mechanism, mine chutes, and steel pipes; report of Committee on Woodworking-Machine Factories, Aviation Committee (Falu), Committee on Pipe Lines, etc.

STEAM ENGINES

Locomotive, Piston Clearance. The Influence of Clearance Space on Specific Steam Consumption (Der Einfluss des schädlichen Raumes auf den spez. Dampfverbrauch bei Dampfmaschinen, insbesondere bei Dampflokomotiven), Wichtendahl. Glasers Annalen, vol. 50, no. 4, Feb. 15, 1927, pp. 59–63, 12 figs. It would appear from actual experience on Northern Railway of Spain and Paris-Orléans Railroad, that in 4-cylinder compound locomotives, notwithstanding negative set of valves, extreme compressions occur with ordinary clearance dimensions, which affect unfavorably operation of locomotive; by increasing clearance space, much easier running of locomotive is obtained; author determines what influence size of clearance space has on specific steam consumption; he makes use of theoretical diagram; results show that specific steam consumption increases with increase of admission and increase of clearance space; shows effect of degree of compression. See translation in Mech. Eng., vol. 49, no. 5, May 1927, pp. 455–457, 9 figs.

STEAM PIPES

Coverings. How Thick Should Pipe Covering Be? C. C. Hermann. Gas Age-Rec., vol. 59, no. 14, Apr. 2, 1927, pp. 487 and 489. There is limit beyond which extra heat saving will not warrant additional investment.

High-Pressure. Pipe Lines and Fittings for Maximum Pressure (Rohrleitungen und Armaturen für Höchstdruck), F. Seiffert. V.D.I. Zeit., vol. 71, no. 11, Mar. 12, 1927, pp. 351–356, 15 figs. Calculation of wall thickness for seamless ingot-steel pipes and fittings, taking into consideration higher stresses at temperatures exceeding 300 deg.; design of flanges, stop valves, safety and drain devices for high pressures and temperatures.

STEAM POWER PLANTS

Design. Tendencies in Power Plant Design, F. Hodgkinson. West. Soc. Engrs.—Jl., vol. 32, no. 1, Jan. 1927, pp. 10–28, 7 figs. Progress made in utilizing heat energy; increase in station efficiency; power production combined with other features; power as by-product of process heating; high steam pressures; gains due to reheating; selection of auxiliaries; floating house turbine as standby; dissolved oxygen removed from feedwater; relation of size and speed; desirability of standardization.

Desuperheaters. Steam Desuperheaters. Nat. Engr., vol. 31, no. 4, Apr. 1927, p. 156, 3 figs. Several types of coolers or desuperheaters have been developed to cool heating steam to desired temperature; describes three types, with special reference to very compact type no larger than ordinary valve in which heat transmission is so effective that up to 10 per cent addition of water in spherical filter is totally evaporated to height of 200 mm. Translated abstract from V.D.I. Zeit., Apr. 18, 1925.

Industrial. Industrial Power-Plant Development, S. G. Neiler. Power, vol. 65, no. 14, Apr. 5, 1927, pp. 510–512, 4 figs. Requirements in various manufacturing departments of industry must be considered and demands for service correlated, if maximum results are to be obtained; economical production of power, utilization of by-products, use of higher-speed machines, improved methods of handling and factory routing are some of problems involved.

Mine-Mouth. Mine Mouth Power Plants Have Limitations, G. A. Orrok. Power Plant Eng., vol. 31, no. 7, Apr. 1, 1927, pp. 425–426. Market, water supply and fuel reserve are principal factors affecting plant location. Address at Int. Conference on Bituminous Coal.

Oil-Electric. Unusual Power Demands in Rubber Industry. Oil Engine Power, vol. 5, no. 4, Apr. 1927, pp. 230–232, 5 figs. Describes rubber-mill oil-engine installation in plant of Bickett Rubber Products Corp.; Falk oil engine is 2-cylinder, 4-cycle type developing 300 b.hp. at 257 r.p.m.

Purchasing and Generating Power. How One Concern Solved the Problem of Power for a Small Plant, G. H. Kimball. Power, vol. 65, no. 16, Apr. 19, 1927, pp. 592–593. By purchasing all power in non-heating season and generating enough power during heating season, more than $10,000 a year was saved over previous practice of generating power all the time; new arrangement also provided reserve capacity that insured essential continuity of electric service.

Railway Shops. Two Modern Railway Shop Power Plants. Power Plant Eng., vol. 31, no. 8, Apr. 15, 1927, pp. 444–447, 8 figs. Santa Fe Railway system builds two modern power houses in connection with new locomotive repair shops, generating electric power at one and purchasing it at other; at Albuquerque power plant, reversible motor generator is used to reduce maintenance on large generators; compressors exhaust to turbo-generator condensers; at San Bernardino power plant, motor-driven compressor is used for normal operation

Steel Works. Trend in Steel Plant Power, H. W. Neblett. Power, vol. 65, no. 18, May 3, 1927, pp. 656–660, 10 figs. 118 boilers replaced by 7 through installation of new centralized power plant in Minequa works of Colorado Fuel & Iron Co., Pueblo; it contains also three 10,000-kw. turbo-generators and 4 blowers which replace number of scattered steam-engine plants and drives throughout mills; since electric drive has been installed, mills have repeatedly broken all previous tonnage records; both blast-furnace gas and powdered coal are burned. See also Iron Trade Rev., vol. 80, no. 17, Apr. 28, 1927, pp. 1083–1086, 5 figs.

STEAM TRAPS

Calculation. Calculation of Dimensions for Expansion Traps of Water-Tube Boilers (Le calcul des dimensions à donner aux trappes d'expansion des générateurs aquatubulaires), M. Bochet. Associations Françaises de Propriétaires d'Appareils à Vapeur—Bul., no. 26, Oct. 1926, pp. 233–240, 1 fig. Presents theoretical study. See also comment on pp. 241–242, 1 fig.

STEAM TURBINES

Back-Pressure. Small Back-Pressure Turbines, E. A. Kraft. AEG Progress, vol. 2, no. 1–2, Apr. 1926, pp. 30–31, 2 figs. Details of 300-kw. installation supplied to bleaching and dye works in Vienna; consists of back-pressure turbine, gearing and d.c. generator; turbine runs at speed of 7000 r.p.m. and d.c. generator at 1000 r.p.m.; other similar installations.

Blades. New Method of Calculating Multiple Blades of Impulse Turbines (Une nouvelle méthode de calcul des ailettages multiples à action), C. Colombi. Technique Moderne, vol. 19, no. 4, Feb. 15, 1927, pp. 97–104, 3 figs. Multiple-action turbine is composed of series of elementary turbines; deals with rapid calculation of assembling of turbine from its different elements.

Design. A New Method of Construction for Steam Turbines. Eng. Progress, vol. 8, no. 3, Mar. 1927, p. 70, 3 figs. Object aimed at in new design is to retain open-hearth steel as constructional material for multi-stage high-pressure turbines, and consequently it was decided to depart from former horizontal division of housing; new high-pressure casing results from successive addition of number of single-step annular housing elements to each preceding one in direction of axis; these housings under test were found to stand highest pressures successfully without packing; they can be considered absolutely safe and reliable for pressures up to 200 atmos.

Developments. Steam Turbine Development, E. Pragst. Iron & Steel Engr., vol. 4, no. 3, Mar. 1927, pp. 137–143, 15 figs. Deals only with impulse type as manufactured by General Electric Co.

Heating Water from Exhaust Steam. Heating of Process Water with Bled Steam (Erwärmung von Gebrauchswasser durch Anzapfdampf), M. Hirsch. Archiv für Wärmewirtschaft, vol. 8, no. 3, Mar. 1927, pp. 90–91, 4 figs. Gradual preheating with bleeder steam from low-pressure turbine; development of preheater as multi-stage water-discharge column.

Multi-Casing. Investigations of Modern Multi-Casing Steam Turbines (Untersuchungen an neuzeitlichen mehrgehäusigen Dampfturbinen), E. Josse. V.D.I. Zeit., vol. 71, nos. 11 and 13, Mar. 12 and 26, 1927, pp. 346–350 and 419–421, 10 figs. Comparison of a 16,000-kw. turbine of Stork-Erste Brünner type, for steam at 32.8 atmos. and 396 deg., with triple-casing Brown-Boveri turbine of 10,000 kw. with steam at 12.43 atmos. and 323 deg.; former gave thermodynamical efficiency of 82.9 per cent, whereas latter gave 83.5 per cent.

Packing Glands. Leakage Loss in Labyrinth Glands, J. Ward. Inst. of Mar. Engrs.—Trans., vol. 39, Mar. 1927, pp. 110–117, 4 figs. In labyrinth gland steam is wire-drawn by passing through number of constrictions formed by small clearances between rings on turbine shaft and rings on casing; easiest and quickest method of determining condition of steam after throttling is by drawing horizontal line on total heat-entropy diagram; presents alternative graphical method which writer has used in preference to previous one owing to simpler construction; it also depends on product of pressure drop and initial pressure being constant.

Vibrations. Transverse Vibrations in Rotor Disks of Steam Turbines (Ueber Transversalschwingungen der Dampfturbinen-Laufradscheiben), F. Dubois. Schweizerische Bauzeitung, vol. 89, no. 12, Mar. 19, 1927, pp. 149–153, 3 figs. Presents equation for bending of disks of variable thickness, and gives two examples of application.

STEEL

Austenite Decomposition. The Decomposition of the Austenitic Structure in Steels, R. L. Dowdell and O. E. Harder. Am. Soc. Steel Treating—Trans., vol. 11, no. 4, Apr. 1927, pp. 583–606, 72 figs. Effect of tempering quenched steels for different periods of time at different temperatures was studied by means of changes in hardness and changes in microstructures; effect of severe mechanical stress, such as upsetting austenitic steel, on its decomposition on tempering; austenite more frequently tempers to troostite, but in certain cases typical martensitic needles have been produced on tempering; temperature at which martensitic structure breaks down in any given steel is lower than temperature at which austenitic structure in same steel breaks down.

Ball-Bearing. Comparative Tests on Ball Bearing Steels, T. L. Robinson. Am. Soc. Steel Treating—Trans., vol. 11, no. 4, Apr. 1927, pp. 607–618, 23 figs. Results of series of alternating stress tests in which attempt was made to compare some alloy steels now used in ball-bearing manufacture; tests are supplemented by static bending test designed to eliminate as far as possible any alignment factors; results and subsequent microscopic examination indicated that size and distribution of particles of excess cementite were factors in performance of steel, both under reversed stress or fatigue tests and under static bending test; steels in which these particles of cementite were comparatively small and uniformly distributed showed markedly greater endurance and strength.

Chromium-Nickel. See CHROMIUM-NICKEL STEEL.

Cold Drawing. Cold Working and Quench-Hardening. Metallurgist (Supp. to Engineer), Mar. 25, 1927, pp. 47–48. Review of article by Houdremont & Bürklin in Stahl u. Eisen, Jan. 20, 1927, dealing with hardening of carbon steels by quenching and cold working; correspondence of density changes with hardness when produced by cold work and quenching respectively, was not found to be complete; hardness of cold-drawn steel was considerably lower than that hardened by quenching with same change of volume; on internal-stress hypothesis, localization of effects of cold work cannot be readily understood.

Corrosion. Influence of Rust-Film Thickness upon the Rate of Corrosion of Steels, E. L. Chappell. Indus. & Eng. Chem., vol. 19, no. 4, Apr. 1927, pp. 464–466, 1 fig. In absence of rust films different commercial steels corrode in water or in atmosphere at characteristic rates determined by chemical properties of their surfaces; natural course of atmospheric corrosion does not lead to formation of heavy rust films, so copper-bearing steels have been shown to be superior for this service; underwater corrosion generally leads to formation of heavy rust film, and little difference has been found in corrosion rates of steels under water; there is quantitative decrease in corrosion rate about proportional to increases of rust-film thickness.

Distortion in. Distortion in Heat-Treated, Case-Hardened Carbon Steels, P. J. Haler. Junior Instn. Engrs., vol. 37, Feb. 1927, pp. 216–231, 8 figs. Case-hardening process; considerations relating to distortion; pressure caused by heat treatment; quenching; hardening of milling cutters; relative speed of cooling of skin and interior; applications of theory to practice. Bibliography.

Heat-Resisting Stainless. Progress in the Development and Practical Application of Heat Resisting and Non-Corroding Steels, R. Hadfield. Inst. Mar. Engrs.—Trans., vol. 39, Feb. 1927, pp. 1–47 and (discussion) 47–53, 16 figs. Describes different types of steels in their respective classes, giving idea as to progress already made in their application to industry; steel for steam turbines and fittings; non-corroding steels, with special reference to new type known as Era/CR, its chief advantage over chromium steel being more complete resistance which it offers to ordinary forms of corrosion due to air and water, and to great range of corrosive agencies to which it is resistant; this steel will display its qualities without special heat treatment, and without specially careful machining; gives list of chemical agents to which these steels are completely resistant.

Physical Composition. The Physical Composition of Steel, J. D. Gat. Blast Furnace & Steel Plant, vol. 15, no. 4, Apr. 1927, pp. 173–176, 1 fig. Open-hearth and rolling-mill practice and their influence upon grain structure; effects of rate of cooling; types of ingot molds employed.

Semi-Steel. See SEMI-STEEL.

Smooth-Finish Machining. Smooth Finish Machining of Low Carbon Plain and Alloy Steels, J. S. Vanick and T. H. Wickenden. Am. Soc. Steel Treating—Trans., vol. 11, no. 4, Apr. 1927, pp. 551–568, 3 figs. Plain and alloy low-carbon steels of carburizing type, have, under incorrect operating conditions, tendency to machine to rough finish in final or finishing cuts; it was found that, for each steel and its particular heat treatment, this result was due to existence of critical range of volume-removal rates within which rough finish was obtained; by avoiding this critical range, smoothly finished surfaces could be obtained; applying results of investigation to practice, it was found that cutting conditions leaving rough surface, could be changed to give smooth finish by: lowering, or preferably increasing cutting speed until it is outside of critical range; maintaining speed, but changing cut or feed; sharpening cutting angle of tool and maintaining speed and shape of chip; changing hardness of steel being cut.

Stainless. The Mach[illegible]g of Stainless Steels. Machy. (Lond.), vol. 29, no. 754, Mar. 24, 1927, pp. 815–817. Turning and screwing stainless steel; stainless steel on turret lathes.

Torsional Deformation. Phenomena Occurring in Twisted Steel Bars When Flow Limit Has Been Exhausted (Die Vorgänge nach der Ueberschreitung der Fliessgrenze in verdrehten Eisenstäben), W. Bader and A. Nadai. V.D.I. Zeit., vol. 71, no. 10, Mar. 5, 1927, pp. 317–323, 53 figs. Rules for formation of flow strata in twisted iron bars; position of thin flow lines in etched cross-sections of twisted bars; spreading of flow strata in bars with different cross-sections is experimentally determined.

STEEL CASTINGS

Soundness. Section Affects Soundness of Steel. Forging–Stamping–Heat Treating, vol. 13, no. 3, Mar. 1927, pp. 101–102. Tests from forgings and castings show varying characteristics dependent upon location and section of pieces for tensile or chemical determinations.

STEEL, HEAT TREATMENT OF

Overheating. Study of Overheating of Steels (Etude sur la surchauffe des aciers), L. Aisenstein. Revue Universelle des Mines, vol. 13, no. 3, Feb. 1, 1927, pp. 106–115, 10 figs. Conclusion of work published in same journal in 1925 (vol. 8, no. 6, Dec. 15, 1925); present study deals with nickel and chrome steels. See reference to 1st part in Eng. Index, 1926, p. 713.

Oxyacetylene Flame. Heat Treatment with the Torch, E. E. Thum. Acetylene Jl., vol. 28, no. 10, Apr. 1927, pp. 473–476 and 478, 7 figs. Hardening of small tools; relationships between metal and flame; hardening; drawing or tempering; hardening of malleable iron; annealing.

Stresses Due to Quenching and Tempering. Stresses in Quenched and Tempered Steel, S. L. Hoyt. Am. Soc. Steel Treating—Trans., vol. 11, no. 4, Apr. 1927, pp. 509–527 and (discussion) 528–530 and 658. When high-carbon steel is quenched from above its critical point in water, transformation takes place at about 660 deg. fahr. accompanied by volume change of order of 1 per cent; it was shown by Heyn, Scott and others that mechanism of reaction of steel to quenching operation is such that internal stresses are necessarily set up; tempering is accompanied by volume changes; indicates how stresses operate during quenching and tempering to produce strains in steel and shows how, on such basis, apparently anomalous dimensional changes may be accounted for; general argument is that tensile and compressive stresses may not, at times, exactly balance each other and that their tendency to equalize results in strains or dimensional changes which are superposed on those due to volume changes.

Typewriter Parts. How Typewriter Parts Are Heat-Treated for Long Life, R. L. Manier. Iron Trade Rev., vol. 80, no. 12, Mar. 24, 1927, pp. 769–770, 3 figs. Describes heat-treating and japanning installation at plant of L. C. Smith and Corona Typewriters Inc., Syracuse, N. Y.; gas is employed as fuel and has been found most satisfactory; furnaces of double-chamber type are used in tool department.

STREET RAILWAYS

Car Trucks. Joliet Develops Worm-Drive Trucks to Reduce Unsprung Weight. Elec. Ry. Jl., vol. 69, no. 14, Apr. 2, 1927, pp. 602–605, 9 figs. Complete departure from conventional design is expected to reduce noise, cause less wear and tear on car and track, and increase riding comfort.

Cars. Fundamental Design Changes. Elec. Ry. Jl., vol. 69, no. 13, Mar. 26, 1927, pp. 562–566, 12 figs. Inclosed worm drive from 4 high-speed motors mounted on truck frames, tapered roller bearings and internal expanding brakes are expected to reduce noise and vibration; combination wood and duralumin streamline body.

T

TEMPERATURE MEASUREMENTS

Low Temperatures. Possibilities of Practical Temperature Measurement Below —193 Deg. Cent. (Ueber die Möglichkeiten zur praktischen Temperaturmessung unterhalb —193° C.), F. Henning. Zeit. für die gesamte Kälte-Industrie, vol. 34, no. 2, Feb. 1927, pp. 21–24, 1 fig. Temperature measurement between 0 and —193 deg. cent.; use of platinum thermometer below —193 deg., and other resistance thermometers; vapor-pressure thermometer; temperature measurement in neighborhood of absolute zero point.

TERMINALS, RAILWAY

Freight. Freight Station Meets Needs of Growing Southern City. Ry. Age, vol. 82, no. 16, Mar. 19, 1927, pp. 946–949, 6 figs. Freight house and team track layout at Houston, Texas; outbound house consists merely of open platform protected by wide overhanging roof; other features are large area of concrete roadways, unusually high ratio of tailboard space to platform frontage, transfer platform which is operated by regular freight-house forces, and storage yard in connection with team yard.

TESTING MACHINES

Hydraulic. Hydraulic Testing Machine. Iron Age, vol. 119, no. 15, Apr. 14, 1927, p. 1077, 1 fig. New machine of 1,000,000-lb. capacity, intended for use in testing of side frames and bolsters of freight-car trucks.

Strength. Calibrating Instruments for Strength-Testing Machines (Eichgeräte für Festigkeitsprüfmaschinen), W. Wilk. Stahl u. Eisen, vol. 47, no. 10, Mar. 10, 1927, pp. 409–410. Deals with different types of equipment for calibration of materials-testing machines.

TEXTILE MACHINERY

Weaving Mills. Progress in Weaving Machinery (Fortschritte der Webereimaschinentechnik), J. Walther. V.D.I. Zeit., vol. 71, no. 10, Mar. 5, 1927, pp. 324–326, 13 figs. Increasing output in weaving mills by use of specially built machines and auxiliary equipment; Nicolet weaving machines.

TEXTILE MILLS

Mechanical Research. Mechanical Improvement in Manufacturing, H. S. Busby. Textile World, vol. 71, no. 12, Mar. 19, 1927, pp. 25–26. Stabilization of production and earning capacity by improvement of internal conditions; opportunities available from increasing range of equipment and making better use of working schedules; method and organization for mechanical research; bearing on management problem.

Metal-Working Machines in. Old Equipment Prevents Profit in Textile Machinery. Am. Mach., vol. 66, no. 12, Mar. 24, 1927, pp. 479–480, 2 figs. Data compiled from replies to questionnaire showing that of total of approximately 32,000 machines, nearly 18,000 have passed ten-year point.

TEXTILES

Knit Fabric. Principles of Knit Fabric Production, M. C. Miller. Textile World, vol. 71, no. 15, Apr. 9, 1927, pp. 48–50, 8 figs. How uneven fabric is produced by varying resistance of latches to opening and closing; effect of centrifugal force; devices employed for opening latches and keeping them open; suitable angles for various cams; comparing use of frictioned and free needles.

THERMIT WELDING

Large Pieces. Thermit Welding, J. H. Deppeler. Tech. Eng. News, vol. 8, no. 2, Mar. 1927, pp. 59 and 100, 2 figs. Welding of large pieces by this method.

TIME STUDY

Methods. Better Methods a Time-Study Objective, H. Diemer. Mfg. Industries, vol. 13, no. 3, Mar. 1927, pp. 205–208. Gilbreth's pioneering; objects of time study; Merrick's comment on motion study.

Motion Study and. A Comparison of Time and Motion Studies, S. M. Lowry. Am. Mach., vol. 66, no. 14, Apr. 7, 1927, pp. 561–563. Author seeks to show that differences are merely in method and application, that there is no sharp dividing line, but that one is function of other.

Time-Setting Charts. Time-Setting Charts for Diversified Work, E. E. Burke. Machy. (N. Y.), vol. 33, no. 8, Apr. 1927, pp. 594–597, 4 figs. Making elementary time studies; how time-setting charts were developed at shops of Kent-Owens Machine Co., Toledo, O.

TIRES, RUBBER

Motor-Truck. The Motor-Truck Tire in Its Relations to the Vehicle and to the Road, J. A. Buchanan. Soc. Automotive Engrs.—Jl., vol. 20, no. 4, Apr. 1927, pp. 469–477, 14 figs. Presents some important data that have resulted from researches by Bur. Public Roads; general view is given of effects of vehicle type, wheel load, tire equipment, speed, and road conditions on gasoline consumption, tractive resistance and impact reactions.

TUBES

Steel, Seamless. Influence of Coal Working on Strength Properties and Structure of Seamless Steel Tubes (Einfluss des Kaltziehens auf die Festigkeitseigenschaften und das Gefüge von nahtlosen Stahlrohren verschiedener Vorbehandlung), A. Pomp and W. Albert. Stahl u. Eisen, vol. 47, no. 11, Mar. 17, 1927, pp. 459–463, 8 figs. Results of tests on seamless tubes which have undergone different preliminary treatment; contains supplement on power required in tube drawing. Abstract of paper read before Kaiser Wilhelm Institut für Eisenforschung.

Seamless Steel Tubing; A Bibliography, V. S. Polansky. Blast Furnace & Steel Plant, vol. 15, nos. 2, 3 and 4, Feb., Mar. and Apr., 1927, pp. 88–91, 133–136 and 180–182 and 192. Practially all phases of tube manufacture are covered; Pilger and Mannesmann process receive special attention; American and foreign practice.

W

WATER SOFTENING

Zeolite. Recent Developments in Zeolite Softening, A. S. Behrman. Indus. & Eng. Chem., vol. 19, no. 4, Apr. 1927, pp. 445–447, 3 figs. Demands upon modern zeolite water softener are considerably more axacting than those made on its predecessors; chief among these are greater softening capacity per given volume of zeolite, more rapid rate of base exchange, and minimum loss of water pressure through zeolite bed; distinct advance has been made possible by development of synthetic "gel" type of zeolite, which is principal subject discussed.

WELDING

Central Stations. Welding Reduces Power House Costs, T. E. dePew. Welding Engr., vol. 12, no. 3, Mar. 1927, pp. 25–27, 8 figs. Lower building, operating and maintenance charges are insured by its use at N. Y. Edison East River station.

Electric. See ELECTRIC WELDING, ARC.

Oxyacetylene. See OXYACETYLENE WELDING.

Pipe. Pipe Welding Under Difficulties, G. Walker. Welding Engr., vol. 12, no. 3, Mar. 1927, pp. 29–30, 9 figs. Describes high-pressure steam pipe line which was welded under extremely severe winter weather conditions; welded joint chosen as best for high-pressure line; pipes connected outdoors in midwinter; line tests free of leaks.

Rod. Materials for Welding Rod (Werkstoffe für Schweisstäbe), Kantner. V.D.I. Zeit., vol. 71, no. 8, Feb. 19, 1927, pp. 253, 254. Investigation of influences of rod covering on quality and economy of weld; expense and performance conditions; research work carried out by Committee on Welding of the Verein deutscher Ingenieure.

Steel Castings. The Selection of a Welding Process, L. E. Everett. Forging–Stamping–Heat Treating, vol. 13, no. 3, Mar. 1927, pp. 98–100. Reasons for welding steel castings are considered; its use is not extensive, but for small defects is justified.

Stelliting. Stelliting: A New Welding Process, A. V. Harris. West. Machy. World, vol. 18, no. 3, Mar. 1927, pp. 104–105 and 137, 6 figs. Method of surfacing metal parts with stellite which effects important savings wherever utilization of remarkable properties of alloy is productive of economy.

Steel Plate. Different Methods of Welding Steel Plates (Les différentes méthodes d'exécution des soudures sur toles d'acier). Revue de la Soudure Autogène, vol. 19, no. 156, Feb. 1927, pp. 1301–1307, 28 figs. Describes different methods and gives examples of their application.

Thermit. See THERMIT WELDING.

THE ENGINEERING INDEX

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Mechanical Engineering Section

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ACCIDENT PREVENTION

Industrial Plants. Cutting Accidents 80% in Five Years, C. K. Lee. Mfg. Industries, vol. 8, no. 4, Apr. 1927, pp. 293–295, 6 figs. Methods employed by Westinghouse Elec. & Mfg. Co. at its works in Pittsburgh district.

AIR COMPRESSORS

Air-Delivery Measurement. Measurement of Air Delivery from Compressors, J. N. Williamson. Colliery Eng., vol. 4, no. 38, Apr. 1927, pp. 137–140 and 164, 4 figs. Measurement of volume by receiver method; delivery efficiency; precautions necessary; measurement by nozzle method; low-pressure method; high-pressure nozzle method; determination of size of nozzle.

Centrifugal. Centrifugal Compressors (Les compresseurs centrifuges), L. Lahousay. Revue de l'Industrie Minérale, no. 152, April 15, 1927, pp. 155–176, 28 figs. General principles of compression in centrifugal apparatus; number of stages; principles of refrigeration, and different processes employed in cooling of air; output of centrifugal compressors and energy losses; characteristic curves; control and utilization of compressors in compressed-air plants.

AIR CONDITIONING

Comfort Zone for Men at Rest. The Comfort Zone for Men at Rest and Stripped to the Waist, C. P. Yaglou. Am. Soc. Heat. & Vent. Engrs., vol. 33, no. 5, May 1927, pp. 285–298, 7 figs. Information can be applied to industries where workmen often remove all clothing above the waist; it brings out influence of clothing and also of acclimatization upon seasonal variation in optimum temperature; experiments were conducted in psychrometric chamber of Department of Ventilation and Illumination, Harvard School of Public Health; comfort zone has been found to lie between 66 and 82 deg. on effective temperature scale; probable optimum appears to be 72.5 deg.

Industrial Buildings. Getting Away from the Handicap of Climate, F. R. Ellis. Indus. Mgmt. (N. Y.), vol. 73, no. 5, May 1927, pp. 274–278. Air conditioning in industrial buildings; saturation and air temperature; effect of humidity on materials and process; production of artificial climate; removing excess moisture from air; control of air-conditioning equipment; applications of air conditioning in textile industry and other industries.

AIRPLANE ENGINES

Fuel-Injection. Some Factors Affecting the Reproducibility of Penetration and the Cut-Off of Oil Sprays for Fuel-Injection Engines, E. G. Beardsley. Nat. Advisory Committee for Aeronautics—Report no. 258, 1927, 10 pp., 6 figs. Investigation was undertaken of Langley Memorial Aeronautical Laboratory to determine factors controlling reproducibility of spray penetration and secondary discharges after cut-off; effects of two types of injection valves, injection-valve tube length, initial pressure in injection-valve tube, speed of injection control mechanism, and time of spray cut-off, on reproducibility of spray penetration, and on secondary discharges.

Hornet. Pratt & Whitney Hornet Engine Successfully Passes Navy Fifty Hour Type Test. Aviation, vol. 22, no. 18, May 2, 1927, pp. 897–899, 4 figs. New air-cooled radial on test develops 525 hp. and weighs 1.28 lb. per hp. installed; likeness of engine to well-known Wasp type enables ready interchange in aircraft.

Power Measurement in Flight. The Direct Measurement of Engine Power on an Airplane in Flight with a Hub Type Dynamometer, W. D. Gove and M. W. Green. Nat. Advisory Committee for Aeronautics—Report, no. 252, pp. 3–11, 11 figs. Tests made at Langley Memorial Aeronautical Laboratory to obtain direct measurements of engine power in flight; tests were made with Bendemann hub dynamometer installed on modified DH-4 airplane, Liberty 12 engine, to determine the suitability of this apparatus.

Twelve-Cylinder. Twelve-Cylinder 600-Hp. Aeroplane Engine. Engineering, vol. 123, no. 3193, Mar. 25, 1927, pp. 350–352, 4 figs. V-type engine manufactured by Bayerische Motoren Werke, Munich; it is water-cooled and designed for continuous output of 450 hp.; fitted with separate supercharger.

AIRPLANE PROPELLERS

Altitude Flights. Propellers (Luftschrauben für Höhenflugzeuge), H. Borck. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 18, no. 4, Feb. 28, 1927, pp. 83–93, 9 figs. Author deals with question of design of propellers for high-altitude flying; he assumes that flying will take place a mile or more above limit of so-called troposphere where clouds and gusts occur; gives charts for number of characteristic magnitudes for propellers intended for such heights and comes to conclusion that they can be designed quite efficiently; it appears necessary to build airplane to suit propeller rather than to build propeller to suit airplane. See brief translated abstract in Automotive Abstracts, vol. 5, no. 4, Apr. 20, 1927, p. 103.

Characteristics. Airscrew Characteristics and Aeroplane Performance Prediction, J. D. Blyth. Instn. Aeronautical Engrs.—Jl., vol. 1, no. 4, Apr. 1927, pp. 30–37. Presents in immediately useful form information contained in certain publications; method of performance prediction involves use of air screw-torque function curve.

AIRPLANES

Airfoils. Tests of Pneumatic Means for Raising Airfoil Lift and Critical Angle, E. N. Fales and L. V. Kerber. Soc. Automotive Engrs.—Jl., vol. 20, no. 5, May 1927, pp. 575–581, 8 figs. Wind-tunnel research directed toward discovery of satisfactory high-lift wing that would have advantage of structural simplicity, high wing loading, low landing speed and, if possible, reasonably low drag.

Amphibian. The Development of the Amphibian Airplane, W. L. LePage. Aviation, vol. 22, no. 17, Apr. 25, 1927, pp. 828–832, 8 figs. Earliest designers endeavored to develop amphibious aircraft resulting in poor conversions; Leoning production shows pioneer development from first principles.

Bellanca. The Bellanca Monoplane—Holder of the World Endurance Record. Aviation, vol. 22, no. 18, May 2, 1927, pp. 908–910, 2 figs. Details of 6-seater plane which remained in air over 51 hours; it is standard model commercial type.

Design. Apparent Present Tendencies in Airplane Design, V. E. Clark. Aviation, vol. 22, no. 19, May 9, 1927, pp. 985–988, 3 figs. Review of recent developments and practice in various countries, pointing out successful results obtained with designs of widely different types.

Some Notes on the Possibilities of Progress in Aviation. Instn. Aeronautical Engrs.—Jl., vol. 1, no. 4, Apr. 1927, pp. 5–25 and (discussion) 25–29, 20 figs. Theory of boundary layer; compares flow around streamline strut and cylinder; means by which lift is increased and drag reduced; concludes that even small disturbances should be avoided especially on suction side of wings; slotted wings and rotors show how departure may be prevented; new method of sucking air into body may be applied in several ways.

Flying Boats. See FLYING BOATS.

Hamilton. The New Hamilton All-Metal Airplane. Aviation, vol. 22, no. 18, May 2, 1927, pp. 902–904. Latest product of Hamilton Metalplane Co.; 4-passenger all-metal monoplane.

Martin. An Interesting Aircraft Design. Flight (Aircraft Engr.), vol. 19, no. 17, Apr. 28, 1927, pp. 262a to 262d, 5 figs. Details of Martin P.M. 3, with bi-convex airfoil section and very sharp "nose;" monoplane type of wing has been chosen and two fuselages, each carrying engine and accommodating passengers and freight.

Pressure Distribution in Flight. Pressure Distribution over a Wing and Tail Rib of a Ve-7 and of a TS Airplane in Flight, J. W. Crowley, Jr. Nat. Advisory Committee for Aeronautics—Report, no. 257, 1927, pp. 3–37, 37 figs. Investigation to determine pressure distribution over rib of wing and over rib of horizontal tail surface of airplane in flight and to obtain information as to time correlation of loads occurring on these ribs.

Standardization. Standardization in the Air, J. F. Hardecker. Automotive Industries, vol. 56, no. 15, Apr. 16, 1927, pp. 575–577. Rapid progress is made by aircraft industry in standards work since chaotic days of 1918; S.A.E. largely instrumental in starting movement.

Stinson. Stinson Produces Five-Place Cabin Monoplane. Aviation, vol. 22, no. 18, May 2, 1927, p. 906, 1 fig. Whirlwind-engined machine bears striking resemblance to cabin biplane.

Vought Corsair. The Vought Corsair Naval Airplane. Aviation, vol. 22, no. 18, May 2, 1927, pp. 934–940. Two-place convertible observation fighter with single-seater characteristics and performance.

AIRSHIPS

Design. Modern Air-Ships, H. C. A. Von Parseval. Eng. Progress, vol. 8, no. 4, Apr. 1927, pp. 109–111, 1 fig. Commercial airships must use hydrogen for inflation; for peaceful purposes taut, purely inflated airships are more suitable than such with skeletons as they are cheaper, have greater load capacity, and do not involve risk of fractures in skeleton; taut, inflated airships have been much improved by introducing steel netting.

ALLOY STEELS

Molybdenum in. Molybdenum in Alloy Steels. Metallurgist (Supp. to Engineer), Apr. 20, 1927, pp. 51–52. Review of report by J. A. Jones of Research Department, Woolwich, on influence of molybdenum on medium-carbon steels containing nickel, and chromium, dealing with wide range of steels to which molybdenum has been added; report confirms Gillett and Mack's work in establishing definite field of utility for molybdenum as additional constituent of alloy steels; outstanding feature among properties of nickel-chromium-molybdenum steels is relative absence of mass effect shown by uniformity of properties through thickness of large forgings after treatment.

Railways. Alloy Steels in the Railroads, F. J.

Note.—The abbreviations used in indexing are as follows:
Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

Griffiths. Ry. Club of Pittsburgh—Official Proc., vol. 26, no. 5, Mar. 24, 1927, pp. 94–98 and (discussion), 98–116. Use of high-manganese rails; vanadium steel in locomotive frames, side arms, rods and pins; leaf springs which were formerly made of carbon steel are now made of silico-manganese or of chrome vanadium; alloy-steel bearings for railroad cars; heat-treated alloy steels in staybolts and engine bolts; alloys used for sake of resistance to corrosion.

ALLOYS

Aluminum. See ALUMINUM ALLOYS.

Brass. See BRASS.

Elasticity and Viscosity. Elastic and Viscous Properties of Alloys (Les propriétés élastiques et visqueuses des alliages), M. Chevenard. Société des Ingénieurs Civils de France—Procès-Verbal, no. 6, Apr. 8, 1927, pp. 134–140 and (discussion) 140–142. Modula of elasticity and internal friction; influence of temperature, composition, cold working and hardening; isothermal viscosity; viscosity at increasing temperature.

Low-Melting. Transformation Phenomena of Low-Melting Alloys (Rose's metal) [Umwandlungserscheinungen bei leicht schmelzbaren Legieurngen (Rosesches Metall)], R. Fleischmann. Zeit. für Physik, vol. 41, no. 1, 1927, pp. 8–17, 8 figs. Investigated tin-lead-bismuth alloy is shown, by dilatometric and resistance measurements, to exist in three different modifications; thermoelectric experiments on alloy confirm these results. Brief translated abstract in Brit. Chem. Abstracts, Mar. 1927, p. 195.

Non-Ferrous. See NON-FERROUS ALLOYS.

Zinc. See ZINC ALLOYS.

ALUMINUM

Machining. The Working of Aluminum (Die Bearbeitung von Aluminum), P. Vogelsang. Zeit. für Metallkunde, vol. 19, no. 3, Mar. 1927, pp. 117–118, 7 figs. Describes cutting tools such as drills, reamers, tool steel, millers, etc., for machining of aluminum; gives example of machine equipped with special tools for machining aluminum automobile change gears.

Preparation and Uses. Light Metals (De lette metaller), S. Kloumann. Teknisk Tidskrift (Allmänna Avdelningen), vol. 57, nos. 15 and 16, Apr. 16 and 23, 1927, pp. 122–127 and 129–133, 14 figs. Describes different kinds of light metals, especially aluminum, use in automobiles, railway cars, buses, tanks, and widespread use in manufacture of kitchen utensils; deals also with beryllium and magnesium.

ALUMINUM ALLOYS

Aircraft Industry. U. S. Aircraft Industry Developing into Important Factor in Aluminum and Light Alloys. Am. Metal Market, vol. 34, no. 75, Apr. 19, 1927, pp. 3–5, 7 figs. Presents replies to questionnaire sent out to producers of aircraft, showing extent and nature of aluminum consumption at present time; there is belief in engineering circle that all-metal type will be generally adopted, owing to numerous advantages gained in operation by reason of strong and light qualities of duralumin.

Aluminum-Silicon. Solubility of Silicon in Aluminum (Ueber die Löslichkeit des Siliziums im Aluminum), W. Köster and J. Müller. Zeit. für Metallkunde, vol. 19, no. 2, Feb. 1927, pp. 532–57, 10 figs. Curve of solubility of silicon in this system; influence of degree of distribution of silicon on analytical results and on hardness. An addition to diagram of state of aluminum-silicon alloys.

Calcium, Influence of. The Influence of Calcium on Aluminium Containing Silicon, J. D. Grogan. Metal Industry (Lond.), vol. 30, no. 15, Apr. 15, 1927, pp. 383–385, 4 figs. Results of investigations; on addition of calcium to aluminum compound $CaAl_3$ appears completely soluble in molten aluminum within range examined, but very slightly soluble in solid aluminum; on addition of silicon to this alloy compound $CaSi_2$ is formed, completely soluble in molten aluminum; in solid aluminum solubility is extremely small at all temperatures. Abstract of paper read before Inst. of Metals.

Constructal. Aluminum Alloys (Aluminium und seine Legierungen), K. L. Meissner. Zeit. für angewandte Chemie, vol. 40, no. 2, Jan. 13, 1927, pp. 61–62. Constructal 2 and constructal 8 are described and compared with duralumin; effect of various alloying metals with respect to tensile strength, elongation, hardness, etc.

Technical Importance. The Significance of Aluminum as Raw Material in German Industry (Die Bedeutung des Aluminiums als Werkstoff für die deutsche Wirtschaft), H. Groeck. Maschinenbau, vol. 6, no. 4, Feb. 17, 1927, pp. 201–202. Total production of aluminum, measured in volumetric units, amounts at present to one-half of copper production; productivity of German works takes second place in world industry; through discovery of aluminum alloys and methods of improving them, a high-grade material is available, development of which deserves closest attention.

AMMONIA COMPRESSORS

Clearance Pockets. Clearance Pockets for Ammonia Compressors, W. H. Motz. Power Plant Eng., vol. 31, no. 10, May 15, 1927, pp. 577–579, 3 figs. Recent developments in clearance pockets; amount of clearance necessary for zero capacity; construction and operation.

APPRENTICES, TRAINING OF

Apprenticeship Certificates. A Uniform Apprenticeship Certificate for Coöperating Groups of Employers, W. S. Conant. Mech. Eng., vol. 49, no. 5a, Mid-May 1927, pp. 547–552. Shows different forms of company apprenticeship certificates; result is presented of attempt to make composite form from these, embodying essentials for any double coöperative district apprentice system.

ARTILLERY

Anti-Aircraft. Antiaircraft Progress, 1926, G. M. Barnes, Ord. Dept. U. S. A. Army Ordnance, vol. 7, no. 41, pp. 339–346, Mar.-Apr., 13 figs. Results of tests at Aberdeen; machine-gun tests; 37-mm. gun tests; fire control for 3-in. anti-aircraft battery, transmission system; 3-in. gun with torque amplifier; 105-mm. gun and carriage.

AUTOMOBILE ENGINES

Air Cooling. Air Cooling, J. F. Alcock. Automobile Engr., vol. 17, no. 227, Apr. 1927, pp. 130–134, 14 figs. Experimental method evolved by author of evaluating cooling effect of air streams.

Developments. Some Notes on Petrol-Engine Development, H. R. Ricardo. Automobile Engr., vol. 17, no. 227, Apr. 1927, pp. 149–152 and (discussion) 153–154, 9 figs. How to suppress detonation; valve position; supercharging; torque recoil.

Horch. Horch Eight-Cylinder Engine (Der achtzylindrige Horchmotor, Type 1927), R. Conrad. Motorwagen, vol. 30, no. 6, Feb. 28, 1927, pp. 129–130. Built especially for stiffness and power, it has very small cylinder diameters; two of cylinders are built together without intervening water space; crankcase is built very high so that cylinders have to project far into it; it is admitted that this makes for somewhat inconvenient production; on the other hand it makes it easier to accommodate various drives at flywheel end; combustion space in head is somewhat spherical with valves set at angle; Delco ignition is used. See brief translated abstract in Automotive Abstracts, Apr. 20, 1927, p. 105.

Oil Pumps. Efficiency of Oil Pumps. Automotive Industries, vol. 56, no. 15, Apr. 16, 1927, p. 577. Tests on power consumption and volumetric efficiency of oil pumps as used on automobile and aircraft engines made in the Mechanical Laboratory of Breslau Technical College; tests were made on vane-type pump from Hispano-Suiza aircraft engine and on two gear pumps from automobile engines; it was found that both mechanical efficiency and volumetric efficiency are dependent on viscosity of oil and on any leakage occurring. Translated from V. D. I. Zeit.

Single-Sleeve-Valve. The Single-Sleeve-Valve Engine, W. A. Frederick. Soc. Automotive Engrs.—Jl., vol. 20, no. 5, May 1927, pp. 661–673 and (discussion) 673–678, 17 figs. Details of single-sleeve, or Burt-McCollum, engine; mechanical construction of valve and sleeve-driving mechanism; inherent advantages of characteristic twisting movement of sleeve valves; advantages of detachable head for each cylinder, chief advantages of single-sleeve valve engine are sustained operating efficiency, good power output, and silent operation; method for determining quickly size and arrangement of ports in this type of engine.

Superchargers. What Superchargers Will Do for Motor Vehicles, M. A. Hall. Automotive Mfr., vol. 69, no. 1, Apr. 1927, pp. 5–7 and 13. Advantages which may be expected when this method of forced feeding has been adapted to stock cars; how it works; economies.

AUTOMOBILES

Brakes. Calculation of Car Travel with Brakes Applied (Die Berechnung des wahren Bremsweges), A. Stadie. Motorwagen, vol. 30, no. 4, Feb. 10, 1927, pp. 69–73, 5 figs. Forces which have decelerating, or breaking, effect on vehicle are external resistance, internal natural resistance, and resistance caused by braking; first two forces, even though small in comparison with resistance through braking, must be taken into consideration in accurate calculation.

Theoretical Bases for the Calculation of Ordinary Shoe Brakes (Der teoretiske grundlag for beregningen af den almindelige skobremse), P. A. S. Iversen. Ingeniören, vol. 36, no. 6, Feb. 5, 1927, pp. 63–67, 2 figs. Use of vacuum and pneumatic systems for automobile brakes is less secure than ordinary shoe brake; improvement of latter is shown to be possible in theoretical treatment.

Brakes, Four-Wheel. Four-Wheel Brakes at the Automobile Show (Die Vierradbremse auf der Automobilaustellung.), W. Loewenthal. Motorwagen, vol. 30, no. 5, Feb. 20, 1927, pp. 93–96, 13 figs. Of the 43 automobile types exhibited, 38 were equipped with 4-wheel brakes; main features of these are described.

Four-Wheel Systems and Latest Type of Hydraulic Lockheed-Ate Brakes (Vierradbremssysteme und die neueste Ausführung der hydraulischen Lockheed-Ate Bremsen), N. Stern. Automobil-Rundschau, vol. 29, no. 7, Apr. 1, 1927, pp. 121–125, 12 figs. Details of external brake designed by Becker and recently applied to Adler cars of new Standard type; it is so advantageously placed inside of wheel that it is entirely protected from dirt.

Constantinesco. The Constantinesco Car (Zur Frage des Drehmoment-Wandlers von Constantinesco), C. Steinberg. Motorwagen, vol. 30, no. 4, Feb. 10, 1927, pp. 79–84, 7 figs. Description of car with its continuous torque transformer; it is felt that appearance of Constantinesco converter in commercial form must have powerful influence on automotive engineering henceforth; against device itself as now presented criticism must especially be made that it lacks idling arrangement; in consequence it is necessary to use brakes for very slow travel and one has to use reverse gear to come to a stop; average buyer may not be willing to accept this complication. See brief translated abstract in Automotive Abstracts, Apr. 20, 1927, p. 104.

Headlights. European and American Viewpoints on Automobile Headlighting (Der europäische und der amerikanische Standpunkt in der Frage der Kraftfahrzeugbeleuchtung), F. Born. Automobil-Rundschau, vol. 29, no. 7, Apr. 1, 1927, pp. 128–130, 2 figs. Most European regulations favor a distance and blended light, former to be replaced by latter when driving through towns and meeting other users; American regulations favor a light with certain characteristic distribution of brightness; light beam should provide adequate lighting intensity for road but should not have blinding effect on other automobilists; discusses applicability of American headlighting system to European conditions.

Isotta-Fraschini. The Sports Model Isotta-Fraschini. Auto-Motor Jl., vol. 32, no. 17, Apr. 28, 1927, pp. 353–355, 10 figs. Eight cylinders in line; servo vacuum-operated brakes; 45 hp. nominal; 150 b.hp.

Lubrication. Problems of Motor Car Lubrication, R. B. White. Oil & Gas. Jl., vol. 25, no. 48, Apr. 21, 1927, pp. 143–144. Follies and mysteries of lubricating; troubles rightly or wrongly attributed to oil. Paper read before Am. Oil Men's Assn.

Schneider. The New Th. Schneider. Auto-Motor Jl., vol. 32, no. 1371, Apr. 14, 1927, pp. 317–318, 5 figs. General specification includes new overhead-valve engine, with monobloc cylinders and detachable head, and in unit with clutch and gear, whole being mounted in deep and rigid pressed-steel frame with substantial, gussetted cross-members and with upturned and rearwardly down-curved rear to clear axle and allow of good high-sided bodywork with low loading and low step-in.

S. F. Edge. The S. F. Edge Special Royal A. C. Auto-Motor Jl., vol. 32, no. 14, Apr. 7, 1927, pp. 291–294, 10 figs. It follows general practice in A.C. construction, but has large number of improvements, probably greatest of which is redesigned back axle and combined gear box.

Shock Absorbers. Recent Patents for Shock Absorbers (Neuere Patente über Abfederung, Stossdämpfer), F. Lachmann. Automobil-Rundschau, vol. 29, no. 5, Mar. 1, 1927, pp. 85–88, 14 figs. Describes some of latest patented types.

Volvo. The New Swedish Volvo Automobile (Den nya Svenska volvo-automobilen), E. Hubendick. Teknisk Tidskrift (Mekanik), vol. 57, no. 3, Jan. 22, 1927, pp. 9–12, 6 figs. Details of new 4-cylinder car, 1000 of which will be put on market in 1927.

AUTOMOTIVE FUELS

Anti-Knock. Methods of Measuring the Anti-knock Value of Fuels, H. K. Cummings. Soc. Automotive Engrs.—Jl., vol. 20, no. 5, May 1927, pp. 599–608 and (discussion) 608–613, 22 figs. Review of published data on methods of measuring anti-detonating qualities of motor fuels; reference is made to bibliographies covering earlier work in this field, and outline is given of work in progress at various laboratories and universities; conclusions reached are that nearly all methods in use consist of or depend on engine tests for their interpretation; knock intensity is measured in various ways and with differing degrees of definiteness; anti-knock value of fuel may be expressed in variety of terms according to particular method of test; and rating of fuels by existing methods is usually not independent of test conditions.

Combustion. Combustion of Liquid Fuels in Engines (Les combustibles liquides dans leurs rapports avec les moteurs.), M. Dumanois. Annales de l'Office National des Combustibles Liquides, vol. 2, no. 1, Mar. 1927, pp. 9–20, 4 figs. Author limits his discussion to automobile and airplane engines and to fuels most commonly used, namely, gasoline, ethylene alcohol and methylene alcohol.

Producer and Methane Gas. The French Alternative Fuel Trials, W. F. Bradley. Motor Transport, vol. 44, no. 1152, Apr. 11, 1927, p. 431. Satisfactory results obtained with producer and methane gas; wide variety of machines and fuels.

AVIATION

Detroit-Grand Rapids Line. Detroit-Grand Rapids Airline Pioneers Passenger Transport, B. R. Shaw. Aviation, vol. 22, no. 17, Apr. 25, 1927, p. 827. Proves passenger air transportation feasible; frequency of service an important factor.

Landing-Field Lighting. Handbook of Instructions for Airdrome Landing Field Floodlight Type A-1, W. T. Harding. Air Corps Information Circ., vol. 6, no. 583, Feb. 1, 1927, pp. 1–8, 9 figs. Used as ground aid for making emergency landings at night; its use is contemplated for assistance of those airplanes not equipped with landing lights or whose lights have failed; its function is to illuminate area of landing field sufficient for making safe and easy landing under service conditions.

B

BEARINGS

Anti-Friction. Anti-Friction Bearings on Railway Equipment, W. E. Symons. Ry. & Locomotive Eng., vol. 11, no. 4, Apr. 1927, pp. 100–102. Extensive application and their record on foreign railways.

Eccentrically Loaded. Eccentrically Loaded Bearings, C. S. Darling. Mech. World, vol. 81, no. 2103, Apr. 22, 1927, pp. 282–283, 4 figs. Notes on how far eccentricity can be carried without detriment to running qualities of bearing, surface of which differs in no way from that of ordinary symmetrically loaded bearing.

BEARINGS, BALL

Tolerance of Outside Diameter. The Tolerance of Outside Diameter of Roller and Ball Bearings (Die Tolerierung der Aussendurchmesser der Rollen- und Kugellager), K. Hegner and C. W. Drescher. Maschinenbau, vol. 6, no. 7, Apr. 7, 1927, pp. 341–343. Systematic compilation of different ideas which manufacturers and users have regarding required tolerance; five questions are formulated, answers to which should

clear up question as to character of fit, with which roller and ball bearings should be fitted into holes of casting.

BEARINGS, ROLLER

Railway Cars. Journal Friction in Relation to Train Operation, H. E. Brunner and J. S. Tawresey. Ry. Age, vol. 82, no. 21, Apr. 23, 1927, pp. 1258–1260, 4 figs. Influence of roller bearings on acceleration at high speeds; their effect on brake action.

Rolling Mills. Roller Bearings for Rolling Mills. Engineering, vol. 123, no. 3197, Apr. 25, 1927, pp. 465–467, 10 figs. Results of investigations extending over several years, carried out by Skefko Ball Bearing Co. at their steel works in Sweden.

BELTING

Standardization of Specifications. Putting Power Belting Under Executive Control, W. Staniar. Indus. Mgmt. (N. Y.), vol. 73, no. 4, Apr. 1927, pp. 246–252, 5 figs. Standardization of belting specifications at Oakland Motor Car Plant.

BELTS

Slip of. The Slip of Belts (Sur le glissement des courroies), R. Swyngedauw. Académie des Sciences—Comptes Rendus, vol. 183, no. 20, Nov. 15, 1926, pp. 859–861. Among successive positions taken by element of belt upon pulley, there is one having characteristic properties, namely, where belt speed passes through maximum when pulley is moving; this critical position and its determination for various conditions such as belt tension, angular velocity of pulley, etc., is considered, from which adherence or slip of belt is deduced.

BLAST FURNACES

British Practice. Blast Furnace Practice at Consett Iron Co., Ltd., C. S. Gill. Foundry Trade Jl., vol. 35, no. 557, Apr. 21, 1927, pp. 331–334, and (discussion) no. 558, Apr. 28, pp. 360–362. There are eight blast furnaces, seven of which date from 1873 to 1880 and one modern furnace capable of making up 2500 tons of pig iron per week without addition of scrap to charge; bell and hopper system of lowering material into furnaces is used, and bell is operated by compressed air; materials used, reactions in furnace, materials produced, influence of constituents on pig iron.

British Blast-Furnace and Cupola Practice, J. E. Fletcher. Brit. Cast Iron Research Assn.—Bul., no. 16, Apr. 1927, pp. 6–10. Just as proportions of blast furnace and speed of fuel burning must vary for special conditions of burden (chemical and physical composition, etc.) so in cupola design and operation must follow such variations in physical and chemical composition of fuel and metal charges; in both cases fuel consumption per ton of product is affected by amount of slag required to assist desulphurization of metal and for fluxing of earthy matters in fuel and carried by pig iron and scrap.

BLOWERS.

Regulations. Report of Committee on Blower Systems. Nat. Fire Protection Assn.—Advance Paper, 1927, 18 pp., 6 figs. Revisions of regulations on blower and exhaust systems, primarily for purpose of clarifying intent of certain sections of rules which have been misunderstood in field application, and include rewording and rearrangement of number of sections.

BOILER FEEDWATER

Treatment. Factors Bearing on Proper Water Treatment, D. C. Carmichael. Power Plant Eng., vol. 31, no. 9, May 1, 1927, pp. 505–509, 7 figs. Analysis of data collected in three plants to determine most important factors to be considered in treatment of feedwater.

BOILER FIRING

Low-Grade Coal. Utilizing Iowa's Coal Resources. Power Plant Eng., vol. 31, no. 10, May 15, 1927, pp. 558–559. Low-grade Iowa coal is being successfully used in both chain-grate and underfed stokers and in pulverized form, and its utilization is economic rather than mechanical problem.

BOILER FURNACES

Air Preheaters. Air Preheaters for Boilers, R. E. Butler. Engrs.' Soc. West. Pa.—Proc., vol. 42, no. 10, Jan. 1927, pp. 531–540 and (discussion) 540–542. Air preheaters, as today offered, may be classed under two general types, plate and tubular; rotative regenerative heater is only one form of plate-type heater; author's company has manufactured heaters of both types, but today is offering tubular heaters only, believing that this type best fills mechanical requirements of design.

Slag Prevention. Experiments with Furnace Slag Prevention, G. G. McVicker. Power, vol. 65, no. 20, May 17, 1927, pp. 743–744, 3 figs. After various methods of using salt had been tested it was found that crucible of salt placed on shelf within furnace greatly reduced slag trouble on brickwork and tubes.

Wood-Waste-Burning. Power from Wood and Combustible Refuse. Power Engr., vol. 22, no. 254, May 1927, pp. 165–166, 5 figs. Notes on practical furnace arrangements that have been found successful.

BOILER OPERATION

Separator for Purifying Steam. Purifying Steam with a Separator, C. E. Joos. Power, vol. 65, no. 19, May 10, 1927, p. 710, 1 fig. Installation of specially designed Cochrane receiver separators between steam drums and superheaters; since separator was installed it has not been necessary to replace single superheater tube and no deposits have accumulated.

BOILER PLANTS

Model. Model Boiler House at the British Industries Fair, Birmingham. Eng. and Boiler House Rev., vol. 40, no. 10, Apr. 1927, pp. 506–516, 8 figs. Exhibit included both water-tube and Lancashire boiler, each set up in position and coupled to their principal auxiliaries in working position.

BOILER PLATE

Annealing. The Annealing of Boiler Plate (Contribution à l'étude du recuit des tôles pour chaudières), S. P. Wologdine. Revue de Métallurgie, vol. 24, no. 2, Feb. 1927, pp. 64–67, 9 figs. Results of author's study; points out that distribution of stresses can vary greatly and depends on conditions of deformation. Translated from Russian.

Nickel-Steel. Canadian Pacific's New Locomotive Gives Improved Performance. Boiler Maker, vol. 27, no. 4, Apr. 1927, pp. 102–104, 4 figs. Use of nickel-steel boiler plate makes possible increase in boiler pressure and high efficiency.

BOILERS

Brunler Flame. The Brunler Flame and Its Industrial Applications. Engrs. and Eng., vol. 44, no. 4, Apr. 1927, pp. 85–87, 3 figs. Explains operation of boiler; combustion is started by means of pilot lamp; fuel and combustion air are supplied under pressure which slightly exceeds boiler pressure; results of experiments to investigate commercial utility of Brunler flame for concentrating liquors, manufacture of calcium nitrate, dehydration of peat, sewage sludge, etc.

Coke-Fired. Coke as a Boiler Fuel, E. W. L. Nicol. Eng. and Boiler House Rev., vol. 40, no. 10, Apr. 1927, pp. 522–524. Deals with Lancashire boilers and sandwich systems for water-tube boilers.

Deterioration. Cause of Dangerous Boiler Deterioration, C. E. Stromeyer. Power, vol. 65, no. 17, Apr. 26, 1927, pp. 648–649. Prominence is given to uniform wasting, which is most misleading and dangerous corrosion to be met with in boilers, and has been cause of many disastrous explosions; incrustation; causes of failures of apparently sound plates, prominence being given to possibility of caustic embrittlement. Abstract of 1926 report of Manchester Steam Users' Assn. of London.

Internal-Combustion. Internal v. External Combustion Boilers, D. M. Mackay. Power Engr., vol. 22, no. 254, May 1927, pp. 183–185, 1 fig. Discusses relative advantages of various types of boilers with regard to internal-combustion boiler.

Pulverized-Coal. Large Boiler Units at the Prince's Generating Station, Birmingham. Eng. and Boiler House Rev., vol. 40, no. 10, Apr. 1927, pp. 501–506, 8 figs. Details of four 150,000-lb. boilers, fired with powdered fuel, in course of erection at Nechells, Birmingham, Eng.

Steam Loop. The Steam Loop and How It Operates. Power, vol. 65, no. 18, May 3, 1927, pp. 661–662, 2 figs. Consists of insulated riser connecting point to be drained to horizontal condenser located considerably above boiler and drop-leg, also insulated, connecting condenser with boiler drum below water line; used for conserving steam-line condensation.

Steaming Capacity. Methods of Increasing Steaming Capacity of Boilers. Power Engr., vol. 22, no. 254, May 1927, pp. 177–178. When shortage of steam occurs, and additional boiler cannot be purchased, existing plant can be made to meet increased demand.

Waste-Gas. A Determination of the Efficiency of an Exhaust Gas Boiler, G. Cook. Engineer, vol. 143, no. 3718, Apr. 15, 1927, pp. 403–404, 4 figs. Results of tests carried out on small waste-gas boilers constructed by Clarkeson Trumble Tube Boiler Co., fitted to 18-b.hp. Crossley gas engine.

Waste-Heat. The New Kieler Waste Heat Boiler, D. Elvers. Am. Gas Jl., vol. 126, no. 19, May 7, 1927, pp. 455–457. Installation in Germany in which waste-heat boiler was used consisted of battery of coke ovens fired with their own gas, which was not subjected to any preliminary heating, and then comparatively large quantities of waste heat were recovered in steam boilers connected with coke ovens; cooling hot coke with combustible gases; removing cooled coke; thermal efficiency of operation. Translated from Gas- u. Wasserfach, vol. 69, Nov. 27, 1926. See reference to original article in Eng. Index, 1926, p. 191.

BOILERS, WATER-TUBE

Vertical. Experimental Results with a Reconstructed Hanomag Vertical-Tube Boiler (Versuchsergebnisse an einem umgebauten Hanomag-Steilrohrkessel), O. Bosse. Zeit. des Oberschlesischen Berg- u. Hüttenmännischen Vereins za Katowice, vol. 66, no. 4, Apr. 1927, pp. 227–232, 3 figs. Results of experiments show that special attention must be given to use of degassed condensate and distillate; if chemically pure water is used, it must be considerably softened; for boiler furnaces, high combustion chambers, large radiation surfaces and long gas passages are required.

BORING MACHINES

Horizontal Duplex. Baker Horizontal Duplex Boring Machine with Hydraulic Feed. Am. Mach., vol. 66, no. 16, Apr. 21, 1927, pp. 673–674, 2 figs. Multiple-spindle machine devloped by Baker Bros., Toledo, Ohio, for simultaneously boring idler-shaft, mainshaft and countershaft bores in two automotive transmission cases.

BRASS

Hot Brittleness. Hot Brittleness of Brass (Die Warmsprödigkeit von Messing), R. Mailänder. Zeit. für Metallkunde, vol. 19, no. 2, Feb. 1927, pp. 44–51, 18 figs. Brittleness of brass at high temperatures as examined; that brittleness of brass is function of temperature is shown by fact that after quenching from 500 deg., metal behaves normally in test; addition of small quantities of lead to brass intensifies brittle behavior of metal at high temperatures; results indicate that sudden heating of severely cold-rolled brass may lead to development of internal cracks. See brief translated abstract in Chem. & Industry, vol. 46, no. 15, Apr. 15, 1927, p. 255.

BRASS FOUNDRIES

American Furnaces. American Furnace Practice for Brass Foundries, H. M. St. John. Metal Industry (Lond.), vol. 30, no. 15, Apr. 15, 1927, pp. 386–388. Factors affecting refractory performance; furnaces using solid fuel; crucible furnaces using oil or gas; open-flame furnaces; indirect-arc electric furnaces; induction furnaces; high rate of production favorable; art of patching.

BUSES

Trolley. The Economy of Trolley Buses as Compared with Gasoline and Storage-Battery Buses (Wirtschaftlichkeit von Oberleitungs-Omnibussen gegenüber Benzin- und Akkumulatoren Omnibussen.), M. Schiemann. Motorwagen, vol. 30, no. 6, Feb. 28, 1927, pp. 119–121. Gives operating costs of these three types showing savings effected by trolley buses.

BUILDINGS

Industrial. The Relation of Building Design to the Manufacturing Process, C. P. Wood. Mech. Eng., vol. 49, no. 5a, Mid-May 1927, pp. 573–580, 29 figs. Broad principles governing building projects; special features of building design, assuming process to have been perfected; descriptions of buildings for manufacture of soap, linoleum, plate glass and textiles, and for publishing magazines and newspapers.

C

CABLES, HOISTING

Safe Loading. Safe Loaking of Cables, Chains and Eyebolts, N. L. Rea. Power, vol. 65, no. 18, May 3, 1927, pp. 667–669, 8 figs. When machinery parts are lifted, account must be taken of increased stresses in individual slings when load is lifted by two or more slings connected to crane hook and making an angle with each other.

CABLEWAYS

Coal Conveyance by. Coal Conveyance by Aerial Ropeway, H. Roe. Iron & Coal Trades Rev., vol. 114, no. 3085, Apr. 15, 1927, pp. 595–596, 2 figs. Dealing with question of transport from coal mine to port, aerial ropeway would frequently eliminate considerable amount of labor and save very appreciable amount of space at both terminal points; other advantages.

Types. Aerial Cableways (Les telefériques). Vie Technique & Industrielle, vol. 9, no. 91, Apr. 1927, pp. 20–28, 22 figs. Notes on calculation and design, with examples of actual installations.

CALORIMETERS

Bomb. The Scholes Bomb Calorimeter. Engineering, vol. 123, no. 3197, Apr. 22, 1927, pp. 499–500, 2 figs. Consists of two main parts described as base and body, made of stainless steel machined from solid billet; general design of bomb facilitates transmission of heat through head and upper walls of body and also enables stirrer used to agitate water in calorimeter vessel to fit body closely, thus ensuring efficient circulation.

CAR WHEELS

Grinding. Ground Car Wheels Assure Accuracy and Reduce Maintenance Costs. Abrasive Industry, vol. 8, no. 5, May 1927, pp. 160–163. Records and statements compiled after exhaustive tests by Norton Co. and mechanical engineers of railways; data show advantages of car-wheel grinding and indicates savings that can be made by use of grinding machine.

CARS, FREIGHT

Automobile. Large Milwaukee Automobile Cars. Ry. Mech. Engr., vol. 101, no. 5, May 1927, pp. 287–289, 2 figs. New design notable for its capacity and substantial construction without excessive weight.

CAST IRON

Annealed. Mechanical and Machining Properties of an Annealed Cast Iron, G. C. Priester and F. J. Curran. Am. Soc. Steel Treating—Trans., vol. 11, no. 5, May 1927, pp. 741–759 and (discussion) 759–762, 9 figs. Results of study of machining and mechanical properties of cast iron used in manufacture of pistons when subjected to various annealing temperatures, machining properties of annealed pistons were studied in modern production plant and various processes are described; results of heat treatment, chemical analysis, machining properties, transverse tests, tensile and hardness tests, compressive and shear tests and effect of time on annealing; microstructure of test bars.

Desulphurizing. Sulphur and Desulphurisation in Cast Iron, R. T. Rolfe. Iron & Steel Industry & Brit. Foundryman, vol. 1, no. 1, Apr. 1, 1927, pp. 3–6, 2 figs. Problem of sulphur in foundry practice, extent to which it is prejudicial, extent to which it may be harmless, and associated problem of desulphurization, its ways and means.

Developments. Recent Developments in Cast Iron and Foundry Practice. Brit. Cast Iron Research Assn.—Bul., no. 16, Apr. 1927, pp. 20–25. Regularity of cupola-melted cast iron; tests by Society of German Iron Founders to determine strength properties that should be prescribed in deliveries of cast iron.

High-Grade. Cast Iron for Machine Construction and Improvements in Melting Practice in Iron Foundries (Gusseisen für den Maschinenbau und Neuerungen im Schmelzbetrieb der Eisengiesserei), J. Mehrtens. Maschinenbau, vol. 6, no. 4, Feb. 17, 1927, pp. 196–201, 1 fig. Definition of high-grade cast iron; standardization work in the foundry; classification of cast iron according to quality; chemical composition; melting-furnace practice; furnaces for high-grade cast

iron; after-treatment of molten iron; design of castings.

High Temperature, Effect of. The Influence of High Temperatures on the Texture and the Mechanical Properties of Cast Iron. Foundry Trade Jl., vol. 35, no. 555, Apr. 7, 1927, pp. 303–304, 1 fig. Piwowarsky's results are confirmed by 13 series out of 15.

Improvement. Improvement of Cast Iron (Die Veredlung des Gusseisens), U. Lohse. V.D.I. Zeit. vol. 71, no. 17, Apr. 1927, pp. 562–564. Difficulties in production of gray cast iron; different investigating methods; structure formation; discusses processes of Walter, Dürkopp-Luyken-Rein, Maschinenfabrik Esslingen, Diefenthäler-Lanz, Wüst, Emmel-Thyssen, Corsalli, Dechesne.

Nickel in. Nickel and Nickel-Chromium in Cast Iron, A. B. Everest. Brit. Cast Iron Research Assn.—Bul., no. 16, Apr. 1927, pp. 14–19. Review of published work; history of developemnt of nickel cast iron; influence of nickel; special alloy cast iron; nickel-chromium cast iron. Bibliography.

CENTRAL STATIONS

Buck, North Carolina. 100,000-Horsepower Steam Auxiliary Station, R. Pfaehler. Power Plant Eng., vol. 31, no. 10, May 15, 1927, pp. 552–558, 8 figs. Pulverized fuel, high-pressure steam, superheat, air preheating and stage heating are features of Buck steam station.

Diesel-Engined. The Panama Canal Diesel-Engined Power Plant. Mech. Eng., vol. 49, no. 5, May 1927, pp. 445–450, 12 figs. Design and data of tests of plant of 12,375-hp. peak-load capacity, comprising three of largest Diesel engines yet built in America.

England. A New Power Station at Poplar. Engineer, vol. 143, no. 3720, Apr. 29, 1927, pp. 466–467, 6 figs. partly on p. 470. New station uses pulverized coal and contains at present a single unit with capacity of 10,000 kw.; there are two sections of coal treatment, one working on Raymond system, and other on Bradley system.

Electricity Supply at Ashford. Elec. Rev., vol. 100, no. 2577, Apr. 15, 1927, pp. 587–588, 3 figs. Municipal electricity-supply undertaking, with a.c. 1200-kw. oil-driven generating station, to which 500 consumers were connected in four months, resulting in a maximum load of 250 kw.

New Plant at Neasden Power Station, Metropolitan Railway. Ry. Gaz., vol. 46, no. 16, Apr. 22, 1927, pp. 524–525 and 532, 2 figs. Recent developments include installation of additional 18,750-kw. Metropolitan-Vickers set, spray-cooling equipment, and new condensing plant.

The Popular Electricity Undertaking. Elec. Rev., vol. 100, no. 2579, Apr. 29, 1927, pp. 667–670, 7 figs. Descriptive features of "Lopulco" pulverized coal-fired boilers, 12,500-kva. turbo-generator, and 6600-volt switchgear installed in new generating station. See also Elec. Times, vol. 71, no. 1853, Apr. 28, pp. 577–579, 5 figs.

Kip's Bay, New York City. Kip's Bay Plant of the New York Steam Corporation. Power, vol. 65, no. 22, May 31, 1927, pp. 808–812, 4 figs. With installed capacity of 1 million pounds of steam per hour, this new station will supply steam for heat and power in uptown district; owing to high land values plant is designed to give high capacity per sq. ft. of floor area; boiler, economizer and air heater comprise single unit with total surface of 71,682 sq. ft.; steam is generated at 275 lb. and discharged through reducing valves to distribution system at 150 lb.; guarantee efficiency of each unit is 88 per cent at 325,000 lb. of steam per hour.

CHROME-NICKEL STEEL

Properties and Heat Treatment. Facts and Principles Concerning Steel and Heat Treatment, H. B. Knowlton. Am. Soc. Steel Treating—Trans., vol. 11, no. 5, May 1927, pp. 791–803, 2 figs. Composition, properties, uses and heat treatments of common types of chromium-nickel steels; low, medium and high chromium-nickel steels with carbon contents from 0.10 to 0.55 per cent; nickel-chromium heat-resisting alloys.

CHROMIUM STEEL

Properties. Chromium and Cobalt Steels (Note sur les aciers au chrome et au cobalt), F. M. Ostroga. Revue de Métallurgie, vol. 24, no. 3, Mar. 1927, pp. 135–145, 22 figs. Dilatation tests; mechanical tests; principal characteristics of chromium and cobalt high-carbon steels; they oxidize only slightly at high temperature.

CHUCKS

Automatic. New Britain No. 23-A Automatic Chucking Machine. Am. Mach., vol. 66, no. 18, May 5, 1927, pp. 750–751, 2 figs. Machine of tool-rotating type having four spindles.

COAL

Briquetting. Low-Volatile Coal, if Satisfactorily Briquetted, Makes Excellent Domestic Fuel, T. Nagel. Coal Age, vol. 31, no. 18, May 5, 1927, pp. 638–640, 3 figs. Disintegration of coal during its mining and preparation, together with low return on slack, is major problem of industry; one solution lies in briquetting with phosphoric-acid binding compound.

Carbonization. Low Temperature Carbonization, D. H. Lander and J. F. Shaw. Fuel Research—Tech. Paper, no. 17, 1927, pp. 1–7. Preliminary account of construction and behavior of latest vertical cast-iron retorts erected at Fuel Research Station for low-temperature carbonization of bituminous coal.

Vertical Retorts for Low-Temperature Carbonization at H. M. Fuel Research Station. Engineering, vol. 123, no. 3197, Apr. 22, 1927, p. 484, 4 figs. Review of Tech. Paper No. 17, issued by Fuel Research Station.

Pulverized. See PULVERIZED COAL.

Volatile Matter in. Determination of Percentage of Volatile Matter in Coal (Détermination du pourcentage des matières volatiles dans les charbons), D. Waard. Chaleur & Industrie, vol. 8, no. 84, Apr. 1927, pp. 202–204, 3 figs. In 1922 Ryks-Institute of Holland confirmed fact that methods and machines for determining volatile matter in coal might lead to very different results, causes of which are herein discussed.

COLD STORAGE

Plants. Operating Methods in a Large Cold-Storage Plant, F. P. MacNeil. Power, vol. 65, no. 19, May 10, 1927, pp. 698–700, 3 figs. Control of temperatures; measuring apparatus; operation of compound compressors; use of clearance pockets.

Terminal Market. The Bronx Terminal Market, J. Eckersley. Refrig. Eng., vol. 13, no. 9, Mar. 1927, pp. 275 and 281, 1 fig. Completed design includes cold-storage building, power house, wholesale and retail poultry and fish markets, together with proper rail connections and classification yards, with facilities for local and Western roads.

Thermometric Lag. Thermometric Lag, with Especial Reference to Cold Storage Practice, E. Griffiths and J. H. Awbery. Refrig. Eng., vol. 13, no. 10, Apr. 1927, pp. 309–312, 5 figs. Discusses magnitudes of some of possible sources of error in determination of temperature of cold stores in ship's hold by means of mercury or spirit thermometer which is carried to deck for purposes of reading; effect of time lag upon reading of thermometer in case when temperature is changing rapidly. Reprint from Collected Researches, Nat. Physical Laboratory, vol. 19, 111, 1926.

COMBUSTION

Pulsatory. Pulsatory Combustion (La combustion vibratoire), L. Mauge. Revue Industrielle, vol. 57, no. 2213, Apr. 1927, pp. 160–164, 2 figs. Speed of chemical reactions constituting combustion is directly proportional to total surface of contact between air and fuel in unit time; by imparting pulsations or vibrations to air, formation of inert layers of CO_2 stratification of air flow, and formation of chimneys through fuel bed are prevented; combustion is accelerated by production of laterial movement of air in fire bed, particularly in case of gas producers; when gas engine is arranged so that its pulsating suction operates on gas producer, consumption of anthracite may be reduced by 20 per cent; characteristic effects of pulsation are to produce more permeable fire bed, more rapid and uniform combustion, and easier and more efficient operation; Deschamps pulsator is described. See brief translated abstract in Power Engr., vol. 22, no. 254, May 1927, p. 195.

CONDENSERS, STEAM

Air Leakage. Method of Measuring Condenser Air Leakage, C. D. Zimmerman, E. Lindseth and C. B. Arnold. Power, vol. 65, no. 20, May 17, 1927, pp. 746–748, 2 figs. Used in Lake Shore station of Cleveland Electric Illuminating Co.; suitable for measuring air or steam; will show effect of condenser-design changes on proportions of air and steam handled.

Performance. Condenser Performance Improves Steadily. Power Plant Eng., vol. 31, no. 9, May 1, 1927, pp. 512–514, 5 figs. Reduction in surface, new methods of tube packing and cleaning, provisions for deaeration, form some of principal factors in recent developments.

Surface. Surface Condensers in Steam Power Plants, J. A. Powell and H. J. Vetlesen. Mech. Eng., vol. 49, no. 5, May 1927, pp. 417–421, 20 figs. Study showing how most economical condenser installation for given power plant can be determined; based on average heat transfer actually obtained in condensers of different makes under normal operating conditions.

Tubes. Some Investigations into the Cause of Erosion of the Tubes of Surface Condensers, C. A. Parsons. Shipbldg. & Shipg. Rec., vol. 29, no. 15, Apr. 14, 1927, pp. 412–416 and (discussion) 446–449, 6 figs. Account of experimental investigations designed to throw light upon actual conditions attending regional disturbances in water box, and manner in which they affect character of flow through tubes in their vicinity, also to investigate possibility that pitting of condenser tubes may in reality be due to water hammer of collapsing vortices, which is known to be potent cause of erosion of screw propellers and of impellers of centrifugal pumps and water turbines. Abstract of paper read at Instn. Nav. Architects. See also Engineer, vol. 143, no. 3717, Apr. 8, 1927, pp. 390–391, 8 figs.; and Engineering, vol. 123, no. 3195, Apr. 8, 1927, pp. 432–435, 7 figs.

CONNECTING RODS

Duralumin. Duralumin Connecting-Rod Machining Methods, F. H. Colvin. Am. Mach., vol. 66, no. 17, Apr. 28, 1927, pp. 697–699, 9 figs. Rough drilling and reaming small end; elongating large end; casting linings in centrifugal machine; grinding ends of bearings; sawing off cap.

COOLING TOWERS

Reinforced-Concrete. Ferro-Concrete Cooling Towers, H. Dickinson. Ferro-Concrete, vol. 18, no. 10, Apr. 1927, pp. 252–256, 2 figs. Erected at Liverpool Corporation Electricity Works.

CORROSION

Joints and Crevices. Corrosion at Joints and Crevices, U. R. Evans. Engineering, vol. 123, no. 3193, Mar. 25, 1927, pp. 362–363. Discusses older and newer electrochemical views of corrosion; deals with question of corrosion at submerged joints, which might be initiated by contact between dissimilar metals, or setting of differential aeration at joint; question of joints exposed to atmosphere. See also Roy. Soc. Arts—Jl., vol. 73, no. 3884, Apr. 29, 1927, pp. 544–562 and (discussion) 562–567, 2 figs.

COST ACCOUNTING

Practical Use. The Practical Uses of Industrial Cost Accounting, P. M. Atkins. Indus. Mgmt. (N. Y.), vol. 73, nos. 4 and 5, Apr. and May, 1927, pp. 210–213 and 290–295. In first place, cost reports may furnish information which is of importance in determination of various business policies, and, in the second place, it assists materially in the administration of policies which have already been initiated. Apr.: Setting of selling prices; cost analysis of lines of product; standardization of product; preparation of master schedule or budget. May: Cost data as a major tool of administration.

Standard Costs. Installing Standard Costs, G. C. Harrison. Mfg. Industries, vol. 13, no. 5, May 1927, pp. 329–332. Standard costs will ultimately supersede job-order cost system; forecast of profits; daily labor-efficiency report; compiling standard costs.

COUPLINGS

Flange. A New Flange Coupling (Die "Bibby"-Kupplung), H. Becker. Maschinenbau, vol. 6, no. 3, Feb. 3, 1927, pp. 119–121, 11 figs. Details of Bibby coupling, of German make, which possesses high elasticity and vibration-damping capacity; examples of its application.

CRANES

Turntable Arrangements. Turntable Arrangements for Jib Cranes, E. G. Fiegehen. Mech. World, vol. 81, no. 2104, Apr. 29, 1927, pp. 299–300, 5 figs. Design admits of many interesting variations, depending upon capacity of crane, space available, nature of service and quality of construction desired.

CRANKSHAFTS

Machining. Franklin Crankshaft Operations, F. H. Colvin. Am. Mach., vol. 66, no. 18, May 5, 1927, pp. 733–736, 10 figs. Franklin is one of two builders of engines using carburized and case-hardened crankshafts; machining and balancing operations.

CUTTING TOOLS

Cooling and Lubrication. Cooling and Lubrication (Zur Kühlung und Schmierung der Schneidwerkzeuge), K. Gottwein. Maschinenbau, vol. 6, nos. 5 and 6, Mar. 10 and 24, 1927, pp. 221–224 and 287–290, 30 figs. Method of determining cooling effect of different liquids or gaseous coolants; influence of bearings and cutting conditions on effect of coolant; experiences with cooling and lubrication in turning, drilling, milling, thread cutting, grinding, etc.

D

DIE CASTING

Alloys. Improved Die-Casting Alloy. Machy. (N. Y.), vol. 33, no. 9, May 1927, p. 684. Die-cast test piece made by Superior Die Casting Co. from improved zinc alloy similar to regular zinc alloy used for die-castings, but improved in manner that increases both tensile strength and twisting resistance.

DIESEL ENGINES

Automobile. Diesel Engines as Automobile Engine (Der Dieselmotor als Kraftfahrzeugmaschine), A. Nägel. V.D.I. Zeit., vol. 71, no. 13, Mar. 26, 1927, pp. 405–410, 32 figs. Junkers automotive engine, and results of tests.

Cylinder Lubrication. Methods of Lubricating Power Cylinders of Diesel Engines, W. O. Northcutt. Oil and Gas Jl., vol. 25, no. 47, Apr. 14, 1927, pp. 170–175, 1 fig. Offers constructive criticism of present methods of applying lubricating oil to power cylinders of Diesel engines and recommends method which, writer believes, will be improvement over present method. Paper read before Petroleum Division, Am. Soc. Mech. Engrs.

Exhaust Temperatures. Diesel Exhaust Temperatures, V. L. Maleev. Power, vol. 65, no. 20, May 17, 1927, p. 760. Results of series of tests performed with three oil engines, all of same make; finds relation between engine load and exhaust temperatures.

Hill. Hill Introduces New Model Diesel. Motorship, vol. 12, no. 5, May 1927, pp. 380–385, 4 figs. High-speed units available in powers from 50 to 125 hp. with completely water-jacketed precombustion chamber.

New Oil Engine for Mobile Service. Oil Engine Power, vol. 5, no. 5, May 1927, pp. 311–312, 3 figs. New 6 x 10, four-cycle, long-stroke engine, especially designed for use on mobile equipment, contractor's machinery and rail cars; made by Hill Diesel Engine Co.

Indicator Diagrams. Diesel Engine Indicator Diagrams. Mar. Engr. & Motorship Bldr., vol. 50, no. 597, May 1927, pp. 192–194, 1 fig. Survey of uses to which indicator diagrams taken from main engines of a motorship can be put.

Railway Traction. Diesel Traction for Railroads, W. Arthur. Mech. Eng., vol. 49, no. 5a, Mid-May 1927, pp. 581–586, 7 figs. General considerations; advantages of "dieselizing" certain railroad services; operating, design and construction problems; weights and speeds; cooling, transmission and vibration problems; maintenance; fuel consumption; general conclusions favoring adoption of Diesel-electric traction.

DRILLING MACHINES

Heavy-Duty. A New Heavy Duty Drillling Machine. Brit. Machine Tool Eng., vol. 4, no. 44, Mar.-Apr., 1927, pp. 565–569, 6 figs. Archdale centralized-control vertical drilling machine embodies numerous features typical of trend of the latest practice in machine-tool design.

Locomotive-Wheel Tires. Locomotive Wheel Tyre Drilling and Tapping Machine. Brit. Machine Tool Eng., vol. 4, no. 44, Mar.-Apr., 1927, pp. 578–580, 2 figs. Machine constructed by William Asquith, Ltd.

Radial. A New Triplex Radial Drilling and Tapping Machine. Brit. Machine Tool Eng., vol. 4, no. 44, Mar.-Apr., 1927, pp. 558–560 and 580, 2 figs. Triple-head girder machine designed and built by Wm. Asquith, Ltd., for one of large Indian Railway companies; this machine is of traverse bed type, each drill head having effective radius of 10 ft. 6 in., so that plates up to 8 ft. wide can be operated upon without necessity of resetting work.

Vertical-Jig. Vertical Jig Drilling and Boring Machine. Engineering, vol. 123, no. 3193, Mar. 25, 1927, p. 352, 14 figs. partly on supp. plate. Can be used either with drill or with boring bar and, by means of its built-in measuring devices on table, tool can be centered on work to ten-thousandth of inch; constructed by Pratt & Whitney Co., Hartford, Conn.

DYNAMOMETERS

Torsion. Torsion Dynamometers for Unusual Conditions (Zwei Torsionsdynamometer für aussergewöhnliche Verhältnisse), E. Burmeister. Kruppsche Monatshefte, vol. 8, Mar. 1927, pp. 61–64, 6 figs. Describes two types of dynamometers, one for torques up to 3000 m-kg. corresponding to output of 4200 hp. at 1000 r.p.m.; and dynamometer for 15 m-kg. and 10,000 r.p.m., for output of 210 hp.

E

EDUCATION, ENGINEERING

Coöperative Method. The Coöperative Method of Engineering Education. Jl. Eng. Education, vol. 17, no. 7, Mar. 1927, pp. 669–735, 7 figs. Appraisal of system employed at University of Cincinnati; presents important facts relating to coöperative courses; analyzes those facts in relation both to methods and to principles involved. Bibliography.

Curricula. Curriculum Revision in the Light of the Board's Recommendations, W. E. Wickenden. Jl. Eng. Education, vol. 17, no. 8, Apr. 1927, pp. 792–801. Preliminary report of Board of Investigation and Coördination includes group of suggestions and recommendations concerning curricula; staff has been examining some of specific problems involved in giving effect to these proposals and has embodied some of its ideas provisionally in schematic group of curricula and certain notes which are set forth to stimulate study and discussion.

General Motors Institute of Technology. The General Motors Institute of Technology, A. Sobey. Mech. Eng., vol. 49, no. 5a, Mid-May 1927, pp. 553–557, 8 figs. Particulars of educational program designed to provide General Motors Corp. with supply of highly skilled service men and trained workers for plants and to furnish broad technical training for its future executives.

Henry Ford Trade School. A Description of the Henry Ford Trade School, F. E. Searle. Mech. Eng., vol. 49, no. 5a, Mid-May 1927, pp. 570–572. Particulars of successful, self-supporting trade school with 1700 students who work two weeks out of three in school shop, devote third week to course of study, and who each receive from $450 to $1000 annually.

ELECTRIC FURNACES

Annealing and Hardening. The Development of Electric Annealing and Hardening Furnaces (Die Weiterentwicklung des elektrischen Glüh und Härteofens), F. Wintermeyer. Centralblatt der Hütten und Walzwerke, vol. 31, no. 13, Mar. 31, 1927, pp. 162–164. Describes different types of furnaces; advantages of electric heating.

High-Frequency. Metallurgy in the High-Frequency Furnace (Zur Metallurgie des Hochfrequenzofens), F. Körber. Zeit. für angewandte Chemie, vol. 40, no. 4, Jan. 27, 1927, p. 124. Recent small-scale experiments at Kaiser Wilhelm Iron Research Institution show promise of great improvements in making electric-furnace steels (soft steel, chrome steel, low-carbon steels, etc.).

Miguet. The Miguet Electrode and the Miguet Furnace, M. Arrouet. Am. Electrochem. Soc.—Advance Paper, no. 36, for mtg., Apr. 28–30, 1927, pp. 351–354, 1 fig. Author shows that when properly designed large single-phase furnaces are practical and will operate efficiently; feature of new furnace is author's improved continuous electrode of large cross-section; bottom of electrode is about 20 cm. above bath, leaving spacious zone for carrying out various reactions, such as refining and alloying.

Rotating-Arc Type. Rotating-Arc Furnace (Four électrique à arc tournant), G. E. Evreinoff and S. Y. Telny. Revue de Métallurgie, vol. 24, no. 2, Feb. 1927, pp. 57–63, 11 figs. Details of furnace developed by authors, employing characteristics obtained by use of exciting coil to cause rotation of arc; same principle can be applied to other types of electric furnaces including Heroult and Girod. Translated from Russian.

ELECTRIC LOCOMOTIVES

Apparatus Layout. Layout of Apparatus on Virginian Electric Locomotives, C. C. Whittaker. Ry. Mech. Engr., vol. 101, no. 5, May 1927, pp. 275–276, 2 figs. Heaviest single piece of apparatus, phase converter weighing 30,832 lb., is held down by 12½-in. bolts through 1⅜-in. holes; second largest piece, main transformer weighing 25,000 lb., offered new problem inasmuch as it is oil-insulated, forced-cooled type; third heaviest piece of apparatus is liquid rheostat, weighing 21,900 lb. complete.

Single-Axle Drive. 1 Do 1-Locomotives of the German State Railway (Die 1 Do 1-Lokomotiven der Deutschen Reichsbahn-Gesellschaft.), A. Wichert and O. Michel. Elektrische Bahnen, vol. 3, no. 3, Mar. 15, 1927, pp. 71–92, 33 figs. Designs and equipment of express locomotives with Brown-Boveri single-axle drive; electrical equipment supplied by A.E.G.; trial results.

ELECTRIC WELDING, ARC

Advantages. Arc Welding, J. F. Lincoln. Mech. Eng., vol. 49, no. 5a, Mid-May 1927, pp. 558–560, 7 figs. Advantages of arc-welded steel parts over those of cast iron or of riveted construction; savings in cost effected by replacing iron castings with arc-welded steel parts; inconsistency of permitting arc welding in superheaters and steam piping and forbidding it in boilers, etc.

Automobile-Body Assembly. Electric Arc Welders Used in Willys-Knight Body Assembly Line. Automotive Industries, vol. 56, no. 15, Apr. 16, 1927, p. 595, 1 fig. Found advantageous in formation of joint between cowl sheet and stamped truss bar forming foundation of windshield frame.

Machines. The Cutler-Marsden Automatic Arc Welding Machines. Commonwealth Engr., vol. 14, no. 8, Mar. 1, 1927, pp. 312–315, 5 figs. Australian invention, developed to do specific class of work on which ordinary electric hand welding had proved unsatisfactory, both by bare and coated electrode methods.

ELEVATORS

Gearless. High-Speed Gearless Elevators. Commonwealth Engr., vol. 14, no. 8, Mar. 1, 1927, pp. 307–311, 6 figs. Two elevators installed in head offices of Victorian State savings bank, Elizabeth St., Melbourne; elevators are of gearless type, i.e., gear or other speed-reducing device is employed between motor and rope-driving sheave, latter being mounted direct upon armature shaft.

EMPLOYEES, TRAINING OF

Rolling Mills. Train Employees for Better Jobs, B. Finney. Iron Age, vol. 119, no. 19, May 12, 1927, pp. 1357–1359. Courses in educational program of American Rolling Mill Co. cover wide range of subjects; instruction in hands of practical men.

EMPLOYMENT MANAGEMENT

Problems of Staff Men. Personnel Problems of Staff Men in Industry, A. B. Rich. Taylor Soc.—Bul., vol. 7, no. 2, Apr. 1927, pp. 375–376. Staff men in industry are defined as those specialists in various fields of management who are not responsible for operating activities, usually referred to as personnel managers, chemical and industrial engineers, chemists, etc.; enumerates characteristics that staff man must cultivate.

Rating Scale. Rating a "Rating Scale," D. Fryer. Indus. Mgmt. (N. Y.), vol. 73, no. 5, May 1927, pp. 301–302, 1 fig. Selection of specific traits for rating; real purpose of rating scale.

F

FANS

Power Required. How to Figure Power Required to Drive Fans. Power, vol. 65, no. 19, May 10, 1927, pp. 708–709, 2 figs. Assuming fan of proper size has been selected and curve of fan efficiency has been obtained from fan manufacturer, power required to drive fan may be computed by dividing air horsepower by fan static efficiency.

FATIGUE

Industrial. Eliminating Fatigue Losses, F. Hahn and S. F. Csohar. Mfg. Industries, vol. 13, no. 5, May 1927, pp. 373–374, 5 figs. Application of physical laws to anatomical motions and their relation to fatigue and production.

FIRE FIGHTING

Standpipe and Hose Systems. Report of Committee on Field Practice. Nat. Fire Protection Assn.—Advance Paper, 1927, pp. 1–12. Presents revisions in regulations for installation of standpipe and hose systems.

FIREBRICK

Steam, Effect of. The Effect of Steam on the Transverse Strength of Fireclay Bricks, C. W. Parmelee and A. E. R. Westman. Am. Ceramic Soc.—Jl., vol. 10, no. 4, Apr. 1927, pp. 292–298, 1 fig. Experiments in which standard straight bricks at 1100 deg. cent. were subjected to action of steam at same temperature and resulting change in transverse strength measured; no significant decrease in strength due to action of steam alone was found.

FITS

Metal, Charts for. Tolerance and Allowance Charts for Metal Fits, T. F. Githens. Mech. Eng., vol. 49, no. 5, May 1927, pp. 414–415, 8 figs. Series of charts graphically showing information tabulated in issue by A.S.M.E. Sectional Committee of Plain Limit Gages for convenience of those who find it preferable to use charts instead of tables of figures.

FLOW OF AIR

Ducts. Experiments on the Flow of Air in Ducts (Fifth Report of the Midland Institute Committee on the Ventilation of Mines), W. E. Cooke and C. F. Statham. Instn. Min. Engrs.—Trans., vol. 73, part 1, Mar. 1927, pp. 78–95 and (discussion) 95–105, 13 figs. partly on supp. plate. Experiments on square duct in mining laboratory of University of Sheffield, 4 ft. in diameter; comparisons of results and conclusions.

FLOW OF FLUIDS

Measurement. The Calculation of Difference of Pressure by Means of Measuring Apparatus for Water, Vapor and Gas (Calcolo dei misuratori a differenza di pressione per acquavapore e gas), G. Conti and C. Spadon. Ingegnerio, vol. 5, no. 8, Aug. 1926, pp. 282–290, 9 figs. Deals specially with Venturi meters extended to disk and diffusor apparatus of measurement. See translated abstract in Refrig. Eng., vol. 13, no. 9, Mar. 1927, p. 287.

Resistance Measurement. The Correct Measurement of Resistance, E. Ower. Colliery Eng., vol. 4, no. 38, Apr. 1927, pp. 162–164, 2 figs. Analysis of errors incurred in usual methods of measuring mean total head in duct with view to the determination of resistance.

FLOW OF GAS

High-Pressure Lines. Gas Flow Through High Pressure Lines, E. L. Rawlins. Oil & Gas Jl., vol. 25, no. 48, Apr. 21, 1927, pp. 40 and 154. Formulas for use in designing lines; problem being considered by Government and Natural Gas Assn. Paper read before Natural Gas Assn. of America.

FLOW OF LIQUIDS

Tubes. Theoretical Formula for Determining the Loss of Head of a Liquid Flowing in a Circular Tube, L. Leibenzon. Petroleum Industry (Russia), vol. 12, no. 3, Mar. 1927, pp. 386–394, 5 figs. Theoretical formula is deduced for coefficient for determining loss of head of liquid moving in round tube; investigation is based on existence of boundary layer and on distribution of velocities in cross-section of tube. (In Russian.)

FLOW OF WATER

Conduits. Formulas for the Flow of Water in Large Pressure Conduits and Aqueducts (Note sur diverses formules relatives à l'écoulement de l'eau dans les conduits et les aqueducs de grandes dimensions), M. Hubie. Annales des Ponts et Chaussées, vol. 97, no. 1, Jan.-Feb. 1927, pp. 5–22, 2 figs. Comparison of most commonly used formulas for pressure discharges; study of experiences and new formulas employed in America; author presents table based on these formulas, to facilitate their employment and to permit comparisons with French formulas.

FLUE GASES

Heat Transmission from. Influence of Whirling on Heat Transmission from Flue Gases (Der Einfluss des Dralls der Feuergase auf den Wärmeübergang in Flammrohren), A. Sauermann. Glückauf, vol. 63, no. 8, Feb. 19, 1927, pp. 276–278, 6 figs. Tests made in two flues of single Lancashire-type boiler, one being fitted with rotary-flow gas burner, and other with parallel-flow burner; it was found that parallel-flow burner produced considerable mixing of gases, layers next to flue walls sinking down each side as they cooled; as consequence, there was rising flow of hot gases from bottom toward top of flue; more thorough mixing produced by rotary burner results in 30 deg. cent. lower gas temperature at end of flue; greater benefit, claimed to be derived from use of helical baffles where solid fuel is burnt, must be ascribed to heating surface being kept cleaner by whirling gases; test data show that rotary-flow gas burner effects more nearly uniform mixing of gas and air, and thus conduces to formation of short, hot flame. See brief translated abstract in Eng. and Boiler House Rev., vol. 40, no. 10, Apr. 1927, p. 532.

FLYING BOATS

Rohrbach-Rocco. Rohrbach-Rocco Commercial Flying Boat (Das Verkehrs-Flugboot "Rohrbach-Rocco"). Luftfahrt, vol. 31, no. 7 and 8, Apr. 7 and 22, 1927, pp. 105–106 and 118–120, 3 figs. Details of monoplane, equipped with 2 Rolls-Royce Condor Engines of 650 hp.; it carries 3 in crew and 10 passengers.

FORGINGS

Brass. Brass Forgings, O. J. Berger. Brass World, vol. 23, no. 4, Apr. 1927, pp. 111–112. Reasons for their growing popularity; comparisons between forgings and castings; type of equipment needed and heating requirements.

FOUNDRIES

Control. Advantages of Foundry Control, H. J. Young. Foundry Trade Jl., vol. 35, no. 558, Apr. 28, 1927, pp. 357–359. Controlling raw materials; high-priced irons must be chemically uniform; economics achieved; Perlit process; dirt and castings; draw holes and other defects; inefficient chaplets; views on costing.

FOUNDRY EQUIPMENT

Sand Mixers. A New Sand Mixer and Aerator. Foundry Trade Jl., vol. 35, no. 557, Apr. 21, 1927, pp. 337–338, 1 fig. Novel form of machine supplied by Universal System of Machine Moulding and Machinery Co., London; which combines function of disintegrator, mixer, aerator, and, within limits, also conveyor; it is entirely self-contained unit mounted with its driving motor on common base which is fitted at fore-end with pair of traveling wheels, and at rear with sockets for reception of handles.

FREIGHT HANDLING

Unboxed Shipments. Reducing Shipping Costs, G. F. Bauer. Mfg. Industries, vol. 13, no. 5, May 1927, pp. 349–352, 5 figs. Automobile manufacturers start using steamers equipped to handle unboxed assembled cars and tractors; if automobiles, with their easily injured parts and delicate finish, can be shipped unboxed without damage and at less expense, so can machines; many wasteful methods now followed in domestic shipments may also be improved by adapting carriers to freight.

FUELS

Coal. See COAL; PULVERIZED COAL.

Low-Grade. The Increasing Use of Low Grade Fuels, D. Brownlie. Eng. and Boiler House Rev., vol. 40, no. 10, Apr. 1927, pp. 516–518. Applies not only to more familiar material, such as small coal washery settlings, coal screenings, etc., but also to all kinds of material in many countries such as green woody and general vegetable material, brown coals and lignites, raw shale and bituminous tar sands.

Oil. See OIL FUEL.

FURNACES, ANNEALING

Heat Transmission In. Heat Transmission in Annealing Furnaces with Firebrick Muffles (Die Wärmeübertragung in Glühofen mit Schamottemuffel), H. Repdy. Archiv für Wärmewirtschaft, vol. 8, no. 4, Apr. 1927, pp. 101–105, 8 figs. Determination of coefficient of heat transmission of firebrick muffle wall taking radiation into consideration; calculation of time required for annealing charge and hourly annealing rate of muffle furnace.

FURNACES, INDUSTRIAL

Design. Industrial Furnaces, C. Longenecker. Iron Trade Rev., vol. 80, nos. 3, 7, 9, 13 and 15, Jan. 20, Feb. 17, Mar. 3, 31 and Apr. 14, 1927, pp. 205–207, 450–452, 575–577, 824–825 and 964–966, 54 figs. Treatise on design, construction and function of modern melting, heating and treating units. Reheating or finishing furnaces.

Recuperators. Recuperators for Industrial Furnaces, W. Trinks. Engrs.' Soc. of West. Pa.—Proc., vol. 42, no. 10, Jan. 1927, pp. 465–490 and (discussion) 491–509, 16 figs. Discusses two cardinal questions: (1) Does it pay to use recuperators? (2) Can recuperators be built so that they are cheap, simple and durable? Types of recuperators; advantage of stack type.

Structural Elements. Notes on the Structural Elements of Industrial Furnaces, A. E. Perkins. Mech. World, vol. 81, no. 2097, Mar. 11, 1927, p. 173. Shows how few simple calculations can enable anyone to provide adequate strength to meet forces that are at work in all industrial furnaces.

FURNACES, MELTING

Rebabbitting. Johnson No. 2-C Melting Furnace. Am. Mach., vol. 66, no. 16, Apr. 21, 1927, p. 674. For use in rebabbitting connecting rods; consists of three melting pots, heavily constructed of cast iron with suitable lids; any soft metal, such as lead, babbitt, tin, zinc or type metal, can be melted in them.

G

GAGES

Indicator Sizing. Churchill Indicator Sizing Gauge. Brit. Machine Tool Eng., vol. 4, no. 44, Mar.-Apr., 1927, pp. 581–582, 3 figs. Facilitates precision grinding of cylindrical parts without necessity of continuous gaging by orthodox methods, and involving stopping of machine.

Plug. The Relation of Finish to Life of Plug Gages, L. M. McPharlin. Am. Mach., vol. 66, no. 19, May 12, 1927, pp. 775–781, 16 figs. Tests show that gages with mechanically lapped surfaces have much longer wear lives than hand-lapped gages, which excel ground gages; photomicrographs indicate progressive stages of wear.

Pressure. Factors Affecting Operation of Pressure Gages, S. A. Curry. Power Plant Eng., vol. 31, no. 10, May 15, 1927, pp. 560–561, 2 figs. Bourdon spring pressure gages may be rendered inaccurate with their limits by improper installation, shocks, high pressures and so on.

GAS ENGINES

Beds, Handling and Machining. Handling and Machining a Big Gas Engine Bed, E. H. Brinker. Am. Mach., vol. 66, no. 17, Apr. 28, 1927, pp. 687–688, 4 figs. Transporting casting from foundry to machine shop; using 48-in. planer as draw-cut shaper; shipping finished piece.

GAS PRODUCERS

Sauvageot Grate. Sauvageot Patent Grate (Sauvageot-Patentfeuerung), H. Lösche. Wärme, vol. 50, no. 12, Mar. 25, 1927, pp. 219–221, 5 figs. This type of firing is said to have been found particularly adaptable to use with gas producers; consists essentially of grate of peculiar construction, air box and mechanical drive; air box contains shaft driving worm and also pipe through which steam and water is delivered to combustion air; this grate has been installed in France in more than 140 gas producers and is now finding market in Germany. See translated abstract in Mech. Eng., vol. 49, no. 6, June, 1927, pp. 682–683, 2 figs.

GASES

Heat Conductivity. Heat Conductivity of Gases (Ueber die Wärmeleitfähigkeit der Gase), S. Weber. Annalen der Physik, vol. 82, no. 4, Feb. 26, 1927, pp. 479–503, 1 fig. Describes simple method, making use of long and short wire, which permits simultaneous determination of heat conductivity of gases and investigation as to whether value obtained is influenced by convection flows; this method thus permits systematic separation of heat loses.

GEAR CUTTING

Indexing Fixture. An Indexing Fixture for Cutting Gears, P. W. Nielson. Am. Mach., vol. 66, no. 19, May 12, 1927, pp. 790–791, 1 fig. With this fixture it is possible to cut gears up to 6-in. outside diameter on old plain horizontal milling machine; all of movable parts are carried upon head that swings upon trunnions in base casting so that fixture is available to cut either plain spur or bevel gears.

Shaping Machines. Double Helical Bevel and Spur Gear Generating Machine at the Leipzig Fair. Machy. (Lond.), vol. 30, no. 760, May 5, 1927, pp. 151–153, 7 figs. Exhibited by Böttcher & Gessner, Altona, Hamburg, bevel gears produced on this machine possess advantages of spiral bevel gear without disadvantage of excessive axial thrust; on same principle, double-helical spur gears may also be cut.

GEARS

Bevel. The Economic Production of Bevel Gears with Curved Teeth (Die wirtschaftliche Herstellung bogenförmig verzahnter Kegelräder), A. Wallichs and H. Blaise. Maschinenbau, vol. 6, no. 6, Mar. 24, 1927, pp. 272–273, 5 figs. Such gears have advantage of soft contact and quiet running; describes Schicht-Preis bevel-gear helicoidal cutting process, with which it is possible to produce curved-tooth bevel gears accurately and economically.

Case-Hardened. Hardened Gears for Street Cars (Gehärtete Zahnräder für Strassenbahnwagen). Kruppsche Montshefte, vol. 8, Mar. 1927, pp. 59–60, 3 figs. Points out advantages of Krupp case-hardened gears.

Chucking. Chucking Bevel Pinions and Gears. West. Machy. World, vol. 18, no. 4, Apr. 1927, p. 169. Accurate device for holding bevel-gear pinions by use of sets of taper rolls placed at three points of circumference which enter spaces between teeth and locate gear in correct position according to pitch line.

Herringbone. From Spiral Bevel Gear to Conical Herringbone Gear (Vom Spiralkegelrad zur zyklischen Pfeilverzahnung), P. Böttcher. Maschinenbau, vol. 6, no. 3, Feb. 3, 1927, pp. 103–109, 14 figs. Describes invention by author; herringbone bevel gear is cut by means of cutting steels that do not travel in circular paths as for spiral gearing, but travel in "V" path with rounded point; this is made possible by pivoting tool holder on gear which in turn travels in stationary internal gear; there are arrangements whereby three tools mounted in same tool holder and oscillated in certain way cut out in succession right and left side of tooth space and space in middle; machine works on generating principle; advantage of process is that ordinary spiral bevel gear is entirely avoided, hence simplified bearing design. See brief translated abstract in Automotive Abstracts, Apr. 20, 1927, p. 113.

Internal Involute Teeth. Drawing an Internal Gear Tooth. West Machy. World, vol. 18, no. 4, Apr. 1927, pp. 169–170, 3 figs. Describes simple method.

Maag. The Production and Testing of Maag Gears (Herstellung und Prüfung der Maag-Zahnräder), M. Maag. V.D.I. Zeit., vol. 71, no. 16, Apr. 16, 1927, pp. 509–515, 23 figs. Characteristics of Maag gears; gear-cutting machine; grounding machine with plate disk; most important testing apparatus.

GRINDING

Internal. Savings Made by Internal Grinding. West. Machy. World, vol. 18, no. 4, Apr. 1927, pp. 153–155, 5 figs. Large quantity production not always necessary to show satisfactory savings on this type of grinding.

Locomotive Parts. Finish British Locomotive Parts by Grinding, V. Delport. Abrasive Industry, vol. 8, no. 5, May 1927, p. 149, 4 figs. Operations of grinding locomotive motion rods and slidebars.

Refinish Locomotive Parts with Precision Abrasive Tools, B. K. Price. Abrasive Industry, vol. 8, no. 5, May 1927, pp. 142–144, 4 figs. Describes machines and operations at a large Eastern shop.

Railway Repair Shops. Abrasive Tools Expedite Locomotive Repair Operations, H. R. Simonds. Abrasive Industry, vol. 8, no. 5, May 1927, pp. 156–158, 3 figs. In large Readville shops of New York, New Haven & Hartford R.R., repairs are standardized; grinding operations.

Grinding Methods of Railroad Shops, H. Rowland. Can. Machy., vol. 37, no. 17, Apr. 28, 1927, pp. 13–15, 8 figs. Outline of grinding operations, including grinding piston rods, axle and motion pins, special grinding attachment.

GRINDING MACHINES

Double-Spindle. Badger No. 224 Double-Spindle Face Grinder. Am. Mach., vol. 66, no. 17, Apr. 28, 1927, pp. 711–712, 2 figs. For use in grinding two opposite parallel surfaces.

GUNS

Manufacture. Where the Navy Builds Its Big Guns, G. H. Dacy. Compressed Air Mag., vol. 32, no. 5, May 1927, pp. 2021–2024, 6 figs. Compressed air contributes in many and various ways at United States Naval Gun Factory, Washington, D. C., to production of naval armament and allied accessories.

H

HAMMERS

Pneumatic. Control and Operation of Pneumatic Hammers (Wartung und Betrieb von Presslufthämmern). Maschinenbau, vol. 6, no. 3, Feb. 3, 1927, p. 137. Data sheet proposed by German Committee for Economic Production.

HARDNESS

Testing. Hardness Testing of Steel Balls by Magnetic Methods, S. R. Williams. Am. Soc. Steel Treating—Trans., vol. 11, no. 5, May 1927, pp. 677–690 and 823, 7 figs. In former paper published in same journal a magnetic method for testing hardness of steel balls was described; present paper deals with improvements in that method and better technique in manipulation as now worked out for outfit.

HEAT

Conduction. Some Problems in the Conduction of Heat, G. Green. Lond., Edinburgh and Dublin Philosophical Mag. & Jl. of Science (Supp. no.), vol. 3, no. 16, Apr. 1927, pp. 784–800. Draws attention to method specially suited to such problems and gives one or two of fundamental solutions required in applying method; main idea underlying method employed is to treat all heat-conduction problems as problems in wave motion.

HEAT TRANSMISSION

Boundary Layers. Heat Transmission in Boundary Layers with Highly Variable Initial Flow (Wärmeübergang in Grenzschichten bei stark veränderlicher Grundströmung.), A. Stodola. Schweiz. Bauzeitung, vol. 89, no. 15, Apr. 9, 1927, pp. 193–196, 2 figs. Extends theory to case of highly variable initial speed and temperature, such as occurs in expansion nozzles; differential equation of temperature; introduction of more accurate velocity function; laminary end layer.

Refrigeration Field. Status of Heat Transmission Data and Knowledge in the Refrigeration Field, P. Nicholls. Refrig. Eng., vol. 13, no. 9, Mar. 1927, pp. 276–281. Deals mainly with such principles of flow as involve heat flow through non-metallic materials, although some fluid to solid transmission must necessarily be included.

HEAT TREATMENT

Oxyactylene Flame. Heat Treatment by the Oxyacetylene Flame, E. E. Thum. Welding Engr., vol. 12, no. 4, Apr. 1927, pp. 35–38, 7 figs. Torch not only provides convenience but furnishes clean, uniform high heat, which is great advantage in this work; hardening of small tools; emergency annealing; relationships between metal and flame; drawing or tempering; hardening of malleable iron.

HEATING AND VENTILATION

Air Infiltration. How to Figure Infiltration, C. F. Wolfsfeld. Heat. & Vent. Mag., vol. 24, no. 5, May 1927, pp. 65–68, 8 figs. Effect of wind velocity and direction, tightness of window, storm sash and new types of construction, and other factors.

HEATING, HOT-WATER

Radiators. Radiators of Small Capacity and Their Uses in Hot-Water Heating Systems (Radiotoren kleinen Inhaltes und ihre Verwendung bei Warmwasserheizungen), K. Rybka. Gesundheits-Ingenieur, vol. 50, no. 13, Mar. 26, 1927, pp. 225–227, 2 figs. Multiple-column radiators and their disadvantages; development of small-dimension radiators.

HEATING, STEAM

Low-Pressure. Typical Defects in Low-Pressure Heating Systems and Suggested Remedies, C. C. Custer. Nat. Engr., vol. 31, no. 5, May 1927, pp. 219–221, 5 figs. Corrosion of return mains; care of water column; layout wherein check valves are not needed in returns.

Systems. Pressure Differences in Steam Heating Systems and Their Bearing on Operation—A Comparative Test of Two Types of Heating Systems, C. A. Dunham. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 33, no. 4, Apr. 1927, pp. 225–231 and (discussion) 231–232. Test demonstrates that differential vacuum-heating system is more efficient than two-pipe gravity system in: closely proportioning heat emission from radiators to heat loss from the building; reducing operating costs and maintaining comfortable room temperatures; quantity of condensate required decreases more proportionately as temperature difference decreases in differential vacuum-heating system than in two-pipe gravity-heating system; cost of heating decreases for both systems as temperature difference decreases, rate of decrease being more rapid for differential vacuum-heating system.

HOBBING MACHINES

Lees-Bradner. The Lees-Bradner Gear Hobbing Machine. Machy. (Lond.), vol. 30, no. 760, May 5, 1927, pp. 143–144, 2 figs. New machine enables higher rates of production to be maintained, controls have been centralized and machine is virtually foolproof.

HOISTS

Brakes. Hoist Brakes (Betrachtungen über Hebzeugbremsen), Goldberger. Fördertechnik u. Frachtverkehr, vol. 20, no. 7, Apr. 1, 1927, pp. 136–140, 12 figs. Comparison of efficiency of two main types of brakes; determination of magnet power; power factor of band and block brakes; resulting pressure force of simple band brake; type of combined block and band brake.

HYDRAULIC GEARS

Waap. The Waap Gear (Das Waap-Triebwerk.), O. Günther. Maschinen-Konstrukteur, vol. 60, no. 6, Mar. 31, 1927, pp. 145–148, 3 figs. Describes new type of hydraulic gear, interesting feature of which is that pressure energy of liquid and not flow energy, with its obvious disadvantages, is applied.

HYDRAULIC TURBINES

Cavitation. Cavitation in Hydraulic Turbines (La Cavitation dans lea turbines hydrauliques). Bul. Technique de la Suisse Romande, vol. 53, no. 7, Mar. 26, 1927, pp. 79–81, 5 figs. Review of paper by J. Hybl read before Academy of Science of Czechoslovakia, analyzing phenomena of cavitation.

Design. The Efficiency of Hydraulic Turbines and Its Relation to Size of Turbine, Heat and Temperature (Verkningsgraden hos vattenturbiner och dess beroende av turbinstorlek, fallhöjd och temperatur), C. G. Haeger. Teknisk Tidskrift (Mekanik), vol. 57, no. 15, Apr. 16, 1927, pp. 49–52. Discusses Camerer's formula

for calculation of increase in efficiency of geometrically similar turbines with increased diameter; refers to work of Hopf and Fromm.

Kaplan. The Kaplan Turbine at Lilla Edet Station (Kaplanturbinen vid Lilla Edet), E. Englesson. Teknisk Tidskrift (Mekanik), vol. 57, no. 11, Mar. 19, 1927, pp. 32–39, 12 figs. Largest and heaviest turbine of this type was built in factories at Kristinehamn, Sweden; does not differ greatly from Francis turbine; test results.

Lawaczeck. The Lawaczeck Turbines at Lilla Edet. Engineering, vol. 123, no. 3196, Apr. 15, 1927, pp. 448–451, 11 figs. partly on p. 456. Details of propeller-type turbines built at Finshyttan works; guide blades are steel castings and frame or crown plate into which they are fitted is of such dimensions that it was necessary to construct it into segments; runner is 6 m. in diameter; governing is effected by means of servomotor, valve of which is controlled by ordinary governor of Watt type.

The Lawaczek Turbines at Lilla Edet Station (Om Lawaczeckturbinerna vid Lilla edet), C. E. Svala. Teknisk Tidskrift (Mekanik), vol. 57, no. 11, Mar. 19, 1927, pp. 39–44, 10 figs. Details of propeller-type turbines.

Specific Speed. Specific Characteristics for Hydraulic Turbines, A. Pfau. Mech. Eng., vol. 49, no. 5a, Mid-May, 1927, pp. 517–520, 1 fig. Suggested new expression for specific speed that is non-dimensional and embraces three fundamental characteristics of turbine; namely, peripheral-speed coefficient, velocity-of-flow coefficient, and efficiency.

Sweden. Hydraulic Turbines at Lilla Edet Hydroelectric Plant (Vattenturbininstallationerna vid Lilla Edets kraftverk), E. J. Millén. Teknisk Tidskrift (Mekanik), vol. 57, no. 11, Mar. 19, 1927, pp. 29–32, 8 figs. One Kaplan and two Lawaczeck turbines were installed, details of which are given.

Testing. Hydraulic Turbine Tests by the Allen Method, C. M. Allen. Power Plant Eng., vol. 31, no. 10, May 15, 1927, pp. 549–551, 9 figs. Electrical conductivity of salt solution forms basis of method which gives required test accuracy without use of coefficients or empirical formulas.

Turbine Testing Institute at Lille Edet (Turbinprovningsanstalten vid Lilla Edet), E. J. Millén. Teknisk Tidskrift (Väg- och Vattenbyggnadskonst), vol. 57, no. 4, Jan. 29, 1927, pp. 3–7, 16 figs. In connection with construction of hydroelectric plant at Lilla Edet, small turbine testing station was built where experiments could be made to determine design and selection of turbines; experiments made with model wheels 1/6 of size at power station.

HYDROELECTRIC DEVELOPMENTS

Ireland. The Shannon Power Development, G. Garbotz. Eng. Progress, vol. 8, no. 4, Apr. 1927, pp. 85–90, 11 figs. Plant will have mean annual output of 462 million kw-hr. which will be used for distribution of power in Irish Free State; work is being carried out by Siemens-Schuckert Works; problems of transportation and power economy during construction.

Ontario. Power Developments on Gatineau River. Can. Engr., vol. 52, no. 15, Apr. 12, 1927, pp. 417–419, 6 figs. Good progress being made with construction work at Chelsea, Farmer's Rapids and Paugan Falls for Gatineau Power Co.; storage reservoir at Lake Baskatong will regulate flow of river; large paper mill at Chelsea.

Twelve Years of Hydro in Ontario, G. J. Mickler. Elec. News, vol. 36, no. 8, Apr. 15, 1927, pp. 31–34, 7 figs. Graphical analysis of domestic and commercial services showing great increase in consumption and larger monthly bills with cheaper power.

Status of. The Hydro-Electric Power Era, W. H. Onken, Jr. Elec. World, vol. 89, no. 20, May 14, 1927, pp. 1003–1005. Increasing economy of modern steam-generating stations is reducing commercial attractiveness of many hydroelectric developments; those that are developed must be fitted into existing systems.

Washington. The Glines Canyon Hydro-Electric Development on the Elwha River of the Northwestern Power & Light Co., Port Angeles, Wash., W. B. McMillan. West. Constr. News, vol. 2, no. 7, Apr. 10, 1927, pp. 33–38, 10 figs. Project includes construction of high dam, pressure conduit and power house.

HYDROELECTRIC PLANTS

Louisville, Ky. Construction Plan and Plant at the Falls of the Ohio. Eng. News-Rec., vol. 98, no. 19, May 12, 1927, pp. 762–769, 15 figs. 100,000-kva. development of power worked out in connection with dams for navigation in river varying in flow from 5000 to 800,000 sec-ft.

Quebec. More Power in the Laurentian District, W. Evans. Elec. News, vol. 36, no. 9, May 1, 1927, pp. 31–33, 5 figs. East Branch Development No. 1 at Mont Rolland, P. Q., one of series of hydroelectric plants of Quebec Southern Power Corp.

Racks and Headgates. Rack Structure and Headgates of Cedar Creek Hydroelectric Station, W. S. Lee. Mech. Eng., vol. 49, no. 5a, Mid-May, 1927, pp. 521–523, 8 figs. Design of rack structure and of type of headgate adopted for water intake at station of Duke Power Co. on Catawba River, near Great Falls, S. C.

I

ICE PLANTS

Manufacturing Expense. Manufacturing Expense of Ice-Making Plants, F. Ophuls. Refrig. Eng., vol. 13, no. 9, Mar. 1927, pp. 271–274 and 281. Discussion based on system of accounting for ice-making and refrigerating plants devised by C. D. Russell, of Anheuser-Busch, St. Louis, Mo.; to make this system of value for combination ice-making and cold-storage plants, simple system was devised by means of which bookkeeper can calculate ton-days of refrigeration separately for each department and divide power-house expense between them in that proportion.

INDICATORS

High-Speed. Some Uses of the High-Speed Multi-Cylinder Indicator, H. M. Jacklin. Mech. Eng., vol. 49, no. 5a, Mid-May 1927, pp. 543–546, 8 figs. Particulars of simple, rugged device for use on high-speed internal-combustion engines and air compressors; diagrams obtained; multi-unit development for obtaining diagrams simultaneously from all cylinders of engine or compressor.

Maihak. Indicating Hp. Without the Planimeter, D. McKay. Motorship, vol. 12, no. 5, May 1927, pp. 390–392, 3 figs. Use of integrator instead of ordinary indicator saves labor of planimetering cards.

INDUSTRIAL MANAGEMENT

Balancing Budgets. A Simple and Effective System to Show Sources of Income and Commitments, A. W. Davis. Mfg. Industries, vol. 8, no. 4, Apr. 1927, pp. 279–282, 5 figs. Points out that financial difficulties are most often due to inability to earn; gives simple complete system for management of income, explains every step and how to take it, showing typical forms and records.

Budgetary Control. How to Cut Overhead Expense, J. H. Barber. Mfg. Industries, vol. 13, no. 5, May 1927, pp. 345–348. Original budget estimate for 1926 for Walworth Co. showed negligible profit; budget was not adopted; instead, intensive study was begun by Committee on Economics; as result, program of cutting expenses and reducing costs was put into effect.

Facilities, Improvement of. Cutting Costs by Improving Facilities, W. A. Hayes. Indus. Mgmt. (N. Y.), vol. 73, no. 4, Apr. 1927, pp. 252–255. Modern equipment and methods afford possibilities of increased profits; importance of water supply; guarding belts.

Inventory Control. More Business on Less Inventory, W. W. Smith. Factory, vol. 38, no. 5, May 1927, pp. 874–875, 3 figs. Describes methods of Smith Bros., manufacturers of cough drops; close but simple control of inventories of both raw material and finished products.

Motion-Time Analysis. Labor Costs at the Lowest Figure, A. B. Segur. Mfg. Industries, vol. 8, no. 4, Apr. 1927, pp. 271–274. Gives 7 steps in motion-time analysis which are applicable to any kind of manufacturing, for they apply to all physical work.

Labor-Time Reduction. Reducing Labor Cost, L. A. Sylvester. Mfg. Industries, vol. 13, no. 5, May 1927, pp. 353–358, 2 figs. Labor-time depends upon way in which work is done, upon working conditions and upon degree of skill of worker; author's methods will help manufacturer to lower his labor costs by reducing his labor-time and by getting most favorable combination of operations, conditions and skill.

Production Continuity. Production Continuity (Fliessarbeit), O. Kienzle. Maschinenbau, vol. 6, no. 4, Feb. 17, 1927, pp. 151–157, 5 figs. Discusses problem of idle and working capital, and production continuity as means of overcoming former; systematic utilization of equipment; arrangement of conveyor system; economic utilization of building space.

Production Control. Disc Method of Checking Progress of Work, A. E. Codling. Machy. (Lond.), vol. 30, no. 757, Apr. 14, 1927, p. 39, 1 fig. Idea of disk method is to show clearly to works managers and those in authority true state of whole factory-production programme; method will show for each job in factory stage of production job has reached; where it may be found in factory; when it moved from its last stage of completion; when it is behind scheduled time; when it is completely held up and reason for such delay; and also urgent jobs.

Equalizing Production in Spite of Seasonal Demand, G. H. Townsend. Mfg. Industries, vol. 13, no. 5, May 1927, pp. 341–344, 6 figs. Production program in Moto-Meter Co. has been so arranged that fairly uniform schedule of manufacturing is maintained, despite sales fluctuations caused by varying demand from consumers for instruments; general policy found most economical is to accumulate stock during slow-sales season and let it gradually be reduced as greater demand develops during busy season.

Purchasing. Fixing Least-Cost Purchase Quantities, R. C. Davis. Mfg. Industries, vol. 13, no. 5, May 1927, pp. 369–372, 2 figs. Finding minimum ordering point.

Saving Through the Purchase Budget, W. N. Mitchess. Mfg. Industries, vol. 8, no. 4, Apr. 1927, pp. 283–286, 3 figs. Adjusting purchases to variable needs of business. Abstracted from author's forthcoming book on purchasing.

Time Study. See TIME STUDY.

INDUSTRIAL ORGANIZATION

Line. Balanced Organization Holds Down Costs, G. H. Townsend. Mfg. Industries, vol. 8, no. 4, Apr. 1927, pp. 249–253, 2 figs. Major policy decided upon by the Moto-Meter Co. is to maintain even flow of production, keep its workmen employed and build for stock; greatest effectiveness has been attained under line organization with minor adaptations of staff form; three major functional divisions are provided: production, finance and records and selling.

INDUSTRIAL PLANTS

Fixed-Equipment Maintenance. Slowing Down Depreciation on the Fixed Equipment, W. G. Ziegler. Indus. Mgmt. (N. Y.), vol. 73, no. 5, May 1927, pp. 279–282. Fixed equipment, such as piping, wiring, sanitary facilities, and so on, is all too often allowed to suffer because its deterioration does not directly affect production.

Location. Labor Consideration in Plant Location, H. S. Colburn. Mfg. Industries, vol. 8, no. 4, Apr. 1927, pp. 261–264. Labor supply and quality taken together not only constitute the major factor in selection or retention of a site for industrial plant, but often are of transcendent importance in manufacturing success.

Manufacturing Effectiveness, Tests of. Four Tests of Manufacturing Effectiveness, B. A. Franklin. Mfg. Industries, vol. 13, no. 5, May 1927, pp. 367–368. Gives four tests to measure work of managing group: (1) Are workers enthusiastic? (2) Is plant in good physical condition? (3) Are methods of operation up-to-date? (4) Does product offer attractive values?

Purchased vs. Generated Power. Reducing Cost of Generated Power, A. F. Sheehan. Mfg. Industries vol. 13, no. 5, May 1927, pp. 365–366. Question of buying or generating power is not usually settled by any single comparison of kw-hr. costs; presents for typical cases: (1) two parallel situations requiring opposite answers; (2) substitute plan which changed possible per cent return into 54 per cent return; (3) $7000 investment replacing $50,000 proposal, with yield of 183 per cent annually; and (4) dollar-down contract involving $25,000 engine installation, rest paid from savings totaling $21,000 yearly.

INDUSTRIAL TRUCKS

Gasoline. The Varied Industrial Uses of Gasoline Tractors and Trucks, N. A. H. Mugruer. Factory, vol. 38, no. 5, May 1927, pp. 866–870, 998 and 1002, 25 figs. Pictorial analysis of types and applications; major types are (1) strictly load-carrying trucks, (2) low-lift trucks, (3) combined load-carrying and load-pulling trucks, (4) strictly load-pulling tractors, (5) crane tractors and (6) crawler-tread caterpillar tractors.

Lift. How To Get the Most from Lift Trucks, W. C. Stuebing. Mfg. Industries, vol. 8, no. 4, Apr. 1927, pp. 253–256, 3 figs. Points out vast economies which they offer both in manufacturing and transportation.

Lift, Skids for. Skids for Use with Lift Trucks As Factors in Reducing Materials Handling Costs, F. L. Eidmann. Indus. Mgmt. (N. Y.), vol. 73, no. 5, May 1927, pp. 283–289, 22 figs. Explains how idea of using skids was first conceived and outlines how use of these materials-handling devices led to later development of hand lift truck; different types of skids.

INSPECTION

Manufactured Articles. Reducing Spoilage Losses P. F. Copper. Mfg. Industries, vol. 13, no. 5, May 1927, pp. 359–360, 1 fig. New solution for difficult problem in the inspection control of manufactured articles.

INSULATION, HEAT

Celotex. The Manufacture and Uses of Celotex Insulating Materials, C. G. Muench. La. Eng. Soc.—Proc., vol. 7, no. 6, Dec. 1926, pp. 198–225 and (discussion) 225–230. Fundamental principles of manufacturing; process has been worked out so that it is comparatively simple and easily controlled, it is made from bagasse; advantages are that it does not flame readily, contains no pitch or rosin, retards passage of heat of fire to combustible material beyond, etc.

Low-Thermal-Conductivity Materials. Some Materials of Low Thermal Conductivity, E. Griffiths. Refrig. Eng., vol. 13, no. 9, Mar. 1927, pp. 283–286. Thermal conductivity of following materials has been determined: expanded rubber (soft and hard), Balsa wood, Kingia Australis fibers, "eel grass" mat, compressed peat, and peat treated with bituminous materials.

INTERNAL-COMBUSTION ENGINES

Fuel Economy. Fuel Waste. Motor Transport, vol. 44, no. 1154, Apr. 25, 1927, pp. 489–490, 2 figs. Problem of ensuring fuel economy in internal-combustion engines at all speeds and loads.

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; GAS ENGINES; OIL ENGINES; SEMI-DIESEL ENGINES; STEAM ENGINES, Internal-Combustion vs.]

IRON AND STEEL

Locomotive. Metallurgy of Locomotive Iron and Steel, F. Williams. Ry. Mech. Engr., vol. 101, no. 5, May 1927, pp. 264–266, 18 figs. With reference to heat treating and physical properties desirable for locomotive use; character of alloy steels; characteristics of spring steel.

IRON CASTINGS

Blast-Furnace. Blast-Furnace Metal Castings. Foundry Trade Jl., vol. 35, no. 557, Apr. 21, 1927, pp. 343–344. It may be considered that use of direct blast-furnace metal was very earliest method adopted of supplying molten metal to iron foundry; exclusion from British specifications; extensive foreign employment; tradional prejudice; direct metal and sulphur content; other grounds of objection to use of direct metal; incorporation of receiver desirable.

Blowholes. The Problem of Blowholes. Iron & Steel Industry & Brit. Foundryman, vol. 1, no. 1, Apr. 1, 1927, pp. 16–17. Simple explanation of their cause and suggestions for minimizing their injurious effect.

Physical vs. Chemical Analysis. Mechanical Methods Make or Mar Castings, E. G. Brock. Can. Foundryman, vol. 18, no. 4, Apr. 1927, pp. 14–15. While chemical analysis is of great value in producing castings free from shrinkage and hard spots, many foundrymen accomplish, without its aid, results which others by shrewd manipulation of elements, fail to achieve; hard castings; shrinkage and risers.

L

LABOR TURNOVER

Reduction. Cutting Labor Cost in Seasonal Business, F. W. Climer. Mfg. Industries, vol. 13, no. 5, May 1927, pp. 361–364, 4 figs. Goodyear reduces turnover 50 per cent in 6 years.

LABORATORIES

Metal Research. How Research Work Is Paying Our Industries, W. B. Lashar. Iron Trade Rev., vol. 80, no. 16, Apr. 21, 1927, pp. 1015–1018, 6 figs. Lay-out and equipment of research laboratory at Bridgeport, Conn., built by American Chain Company; staff has recently given much attention to research in welding wire, metallic protective coatings and magnetic test methods.

LATHES

Copy-Turning Attachment. Turret Lathe Copy-turning Attachment. Machy. (Lond.), vol. 30, no. 757, Apr. 14, 1927, pp. 57–58, 3 figs. Turning attachment of simple construction for use on turret lathes in connection with production of turned pieces.

Individual Drive. Development of Individual Electric Drive of Lathes (Entwicklung des elektrischen Einzelantriebes von Drehbanken), A. Haussmann. Maschinenbau, vol. 6, no. 6, Mar. 24, pp. 274–278, 14 figs. First efforts by a leading firm to develop practical individual drive; factors and requirements to be considered for this type of drive; recent developments; future prospects of individual electric drive.

Multiple-Tool. The Maxicut Lathe, H. Mantell. Machy. (Lond.), vol. 30, no. 757, Apr. 14, 1927, pp. 51–53, 5 figs. Lathe is made in two types, single-pulley all-geared head machine for use on number of parts requiring different spindle speeds, and simplified powerful single-speed model which is kept running on only a few parts, all of which require same spindle speed.

LIQUIDS

Heat of Evaporation. Latent Heat of Vaporization and Density (Verdampfungswärme und Dichte), W. Herz. Zeit. für anorganische u. allgemeine Chemie, vol. 159, no. 4, Feb. 4, 1927, pp. 304–306. Results are shown over wide temperature range for liquids, octane, stannic chloride, methyl alcohol and ammonia, using previously recorded values of terms. Brief translated abstract in Brit. Chem. Abstracts, Mar. 1927, p. 193.

LOCOMOTIVES

Cinder Plants. Mechanical Cinder Plant Serves Several Tracks. Ry. Age, vol. 82, no. 21, Apr. 23, 1927, pp. 1243–1244, 4 figs. Moderate first cost and economy in use of track space are two of primary advantages claimed for new type of cinder-handling plant installed on number of roads.

Cylinder Lubricating Valve. Constant-Lubrication Valve For Superheated Steam Locomotive Cylinders. Engineering, vol. 123, no. 3195, Apr. 8, 1927, p. 418, 2 figs. In order to prevent trouble from steam getting into supply pipes and to condensing, valves have been introduced into pipes near delivery points, reliance being placed on pressure being maintained in lubricating system sufficiently high to overcome that in steam chest and cylinders and prevent oil being fed to these parts; German firm made study of these problems, by fitting glass tubes and pressure gages at various points in pipes of lubricating system and also near cylinders on locomotives in order to make observation on piston valves.

Diesel-Geared. Diesel Locomotive with Gear Transmission, A. I. Lipetz. Ry. Mech. Engr., vol. 101, no. 5, May 1927, pp. 270–275, 7 figs. Diesel-electric locomotive built in Esslingen, Germany, was tested on specially built locomotive testing plant; results of tests and conclusions drawn by Dobrovolsky; concludes that Diesel-geared locomotive is lightest Diesel locomotive in existence; advantage of fuel economy resulting from high thermal efficiency of Diesel-geared locomotive which attains figure of 29.3 per cent; after tests were completed Dobrovolsky locomotive was sent to Russia under its own power.

Electric. See ELECTRIC LOCOMOTIVES.

European Developments. Recent European Motive Power Developments, C. B. Page. West. Soc. Engrs.—Jl., vol. 32, no. 3, Mar. 1927, pp. 77–91 and (discussion) 91–94, 7 figs. It is generally conceded that practical limit in size and weight of piston-type locomotives is about reached but thermal efficiency is low when compared with other power-producing machines; condensed statement of number of important developments during past year in Europe where rapid progress has been made; of these, use of high steam pressures, preheated furnace air and condensing-turbine locomotives seem most interesting; efficiencies more than double best in American practice are obtained.

Four-Cylinder. Four-Cylinder Locomotive for Express Service in England. Ry. Age, vol. 82, no. 23, May 7, 1927, pp. 1403–1404, 1 fig. Built by Southern Railway for high-speed runs; 79-in. drivers; tractive force, 33,500 lb.

4-8-4. The Northern Pacific 4-8-4 Type Locomotives. Ry. Age, vol. 82, no. 21, Apr. 23, 1927, pp. 1239–1242, 5 figs. Used in passenger service over mountain divisions; tractive force, with booster, 68,900 lb.

Frame-Bed Castings. Improved Locomotive Frame Bed. Ry. & Locomotive Eng., vol. 11, no. 4, Apr. 1927, pp. 103–105, 3 figs. Mountain-type locomotive of Southern Pacific Railway having one-piece cast-steel locomotive bed; cast steel used contains 18 per cent carbon and 73 per cent manganese; time required to pour steel into mold for one complete engine bed was about 11 minutes; steel was poured through special nozzle from ladle containing 50 tons of molten steel.

Internal-Combustion. Tractive Effort of Internal-Combustion Locomotives. Ry. Engr., vol. 48, no. 568, May 1927, pp. 182–183. Question as to whether of two-stroke or four-stroke cycle, and also whether of single or double-acting type, is important, since it determines number of power impulses per revolution and also value of mean effective pressure.

Kitson-Meyer. Kitson-Meyer Locomotive for Colombia. Engineer, vol. 143, no. 3716, Apr. 1, 1927, pp. 360–361, 5 figs. partly on supp. plate. Locomotive is 3-ft. gage for line where there are continuous gradients of 1 to 25, and almost continuous curves.

Northern Pacific Type. "Northern Pacific" type Locomotive. Ry. Mech. Engr., vol. 101, no. 5, May 1927, pp. 260–263, 6 figs. Boiler pressure of 210 lb. can be increased to 225 lb. if desired; firebox designed for low-grade fuel; tractive force, 57,500 lb.

Pacific-Type. New Pacific Type Locomotives of the Baltimore & Ohio. Ry. & Locomotive Eng., vol. 11, no. 4, Apr. 1927, pp. 105–106, 1 fig. Named after presidents of United States, they are used in fast passenger service between Washington and New York.

Steam-Turbine. The Reid-MacLeod Steam Turbine Geared Locomotive. Ry. & Locomotive Eng., vol. 11, no. 4, Apr. 1927, pp. 95–99, 8 figs. British development in application of turbine to locomotive.

Switching. Six-wheel Switchers for the Seaboard Air Line. Ry. Mech. Engr., vol. 101, no. 5, May 1927, pp. 266–268, 2 figs. Also Ry. & Locomotive Eng., vol. 11, no. 4, Apr. 1927, pp. 113–114, 1 fig. Maximum tractive force of 45,000 lb. with 65 per cent limited cut-off; total weight, 180,000 lb.

Tenders. The Schneider Tender Locomotives of Grande Banlieu Railway Line (Locomotives-tender Schneider du réseau des chemins de fer de Grande Banlieue), M. Lamarche. Industrie des Voies Ferrées et des Transports Automobiles, vol. 21, no. 243, Mar. 1927, pp. 143–149, 10 figs. Details of locomotives constructed at Schneider works at Creusot; results of trial runs.

LUBRICANTS

Classification and Testing. Lubricants (Schmiermittel), W. Ernst. Maschinenbau, vol. 6, nos. 5 and 6, Mar. 10 and 24, 1927, pp. 227–230 and 284–287, 9 figs. Classification of lubricants; value of analytical data; testing of lubricants and practical experience; measurements in a cotton mill.

LUBRICATING OILS

Tests. Lubricating Oils; Laboratory Tests in Relation to Practical Results, A. G. Marshall and C. H. Barton. Engineering, vol. 123, no. 3195, Apr. 8, 1927, pp. 435–439, 7 figs. It has been shown by research into practical meaning of common laboratory tests for lubricating oils: (1) That there is no substantial benefit to be derived from compounding oil to improve "oiliness," (2) although formation of decomposition products in service is undoubtedly important factor in lubricating-oil quality, laboratory tests at present applied do not evaluate that factor correctly; (3) no justification is apparent for judging of oil by viscosity changes above 70 deg.

LUBRICATION

Machine Shops. Lubrication in Machine Shops (Die Schmierung im Betrieb), H. Ludwig. Maschinenbau, vol. 6, no. 7, Apr. 7, 1927, pp. 323–329, 23 figs. Results of questionnaire sent to 55 German machine shops on where, how and when to lubricate, what lubricant to choose and how much; rules for use of different lubricators with machine tools and transmissions, regular control of lubrication and use of lubricant.

LUMBER

Handling. Material Handling Between Stump and Board, L. C. Bell. Mech. Eng., vol. 49, no. 5a, Mid-May, 1927, pp. 503–516, 14 figs. Processes employed in Appalachian Mountain hardwood section; logging railroads; felling trees; "Ballhooting;" skidding; loading log trains; log pounds; handling in mill; piling and stacking; loading lumber on cars, etc.

M

MACHINE SHOPS

Continuous Production. Continuous Production in German Machine Shops (Fliessarbeit im deutschen Maschinenbau), H. Hänke. Maschinenbau, vol. 6, no. 4, Feb. 17, 1927, pp. 157–162, 14 figs. Also (in English) Eng. Progress, vol. 8, no. 4, Apr. 1927, pp. 105–107, 10 figs. Standardization, classification and specialization as bases for reorganization for economic production; development and present status of continuous production in German machine shops.

MACHINE TOOLS

Axle-Box Machining. Machining Axle Boxes. Brit. Machine Tool Eng., vol. 4, no. 44, Mar.-Apr., 1927, pp. 561–564, 6 figs. To perform boring, facing and radius operations on axle boxes for railway work, Richards & Co. have supplied machine specially constructed with its own crane to facilitate handling of axle boxes, and to avoid delay so often attendant upon use of shop cranes installed for general use.

Developments. Recent Development in Machine Tools, G. E. Bailey and T. Smith. Mech. World, vol. 81, nos. 2096, 2097, 2099, 2101 and 2102, Mar. 4, 11, 25, Apr. 8 and 15, 1927, pp. 165–166, 201, 217–218, 254–255 and 271–272, 13 figs. Reviews developments on various classes of machine tools of general-purpose nature, and calls attention to great necessity for equipping factories with modern tools. Apr. 8: Portable drilling, milling and grinding machines. Apr. 15: Comparisons in four examples of labor and overhead costs resulting from machining of certain jobs on alternative types of machine tools.

Rigidity. Rigidity of Machine Tools (Zum Begriff "Starrheit" bei Werkzeugmaschinen), O. Krug. Maschinenbau, vol. 6, no. 4, Feb. 17, 1927, pp. 169–174, 20 figs. As measure of rigidity, ratio of strength to deformation, and as measure of compactness, ratio of cross-section height to unsupported length, are introduced; relation between rigidity, degree of compactness and material required in bending and twisting; examples of modern designs of drilling machines, lathes, milling machines, planers and grinding machines; points to necessity for scientific research.

Vertical vs. Horizontal Cutting. Selection of Machine Tools. Times Trade & Eng. Supp., vol. 20, no. 459, Apr. 23, 1927, p. 134. Important matter in connection with purchase of machine tools, and still more their employment, is whether action of cutting shall occur in vertical or horizontal direction; deals with turning, drilling, grinding, milling and gear cutting.

MALLEABLE CASTINGS

Manufacture. Some Experience with Malleable Cast Iron, H. Field. Foundry Trade Jl., vol. 35, nos. 553, 554 and 555, Mar. 24, 31 and Apr. 7, 1927, pp. 249–252, 271–274 and 291–292, including discussion, 22 figs. Mar. 24: Notes on number of interesting points which have arisen from time to time; as far as possible, practice rather than theory is dealt with, melting conditions; size limitations; jolt filling of annealing cans; types of ore used. Mar. 31: Annealing pots; nickel-chrome cans; specifications. Apr. 7: Conclusion and discussion.

MATERIALS HANDLING

Equipment. Solving the Materials Handling Problem, S. S. Moore. Can. Machy., vol. 37, no. 15, Apr. 14, 1927, pp. 26–30, 5 figs. Explains how each department of Richards-Wilcox plant at London, Ont., is served by time and labor-saving materials-handling equipment in order that production processes may be facilitated.

The Progenitors of Modern Handling Devices, G. F. Zimmer. Indus. Mgmt. (N. Y.), vol. 73, nos. 2, 4 and 5, Feb., Apr. and May 1927, pp. 74–78, 242–245 and 308–311, 20 figs. Shows that present-day developments may be traced back to use centuries before Christian era. Feb.: Chinese chain pump and chain of pots, are first types of conveyors known. Apr.: Evolution of gravity bucket conveyors, band conveyors and steam jet conveyors. May: Evolution of cranes, rope haulage and skip hoist.

Fixed Equipment. Fixed Equipment Speeds Production, W. T. Spivey. Can. Machy., vol. 37, no. 15, Apr. 14, 1927, pp. 21–23, 3 figs. Outlines progress being made in materials handling by fixed equipment with particular emphasis on increasing application of standardized machines and methods to special problems of industry.

Human Effort. The Movement of Loads by Man Power (Fortbewegung von Lasten durch menschliche Arbeitkraft), E. Atzler. Technik u. Wirtschaft, vol. 20, no. 4, Apr. 1927, pp. 89–98, 3 figs. Results of tests carried out with aid of respiration apparatus to determine energy consumed in drawing or pushing trucks; this was shown to fluctuate considerably under different working conditions; from results obtained, rules were formulated for practical application.

Industrial Plants. Saving of 24 Per Cent Shown by Material Handling System, R. E. Kinkead. Am. Mach., vol. 66, no. 18, May 5, 1927, pp. 721–723, 7 figs. Problems of handling material effectively worked out by Lincoln Electric Co. at Cleveland, O.

Loss Reduction. Cutting Handling Losses, C. A. Fike. Mfg. Industries, vol. 13, no. 5, May 1927, pp. 333–336, 6 figs. Résumé of materials-handling activities of East Pittsburgh plant showing changes and progress made in last few years; examples from present Westinghouse practice.

New York Port. Material Handling in the Port of New York, J. A. Jackson. Mech. Eng., vol. 49, no. 5, May 1927, pp. 411–413. Introduction of mechanical-handling devices hitherto retarded by design of existing structures, present methods of stevedoring, and installations not economically justifiable; methods being used in handling bulk freight; mechanical-handling methods used for package freight.

Rock and Garvel Plant. Union Rock Company Material Handling System, T. U. Hawkins. Cement, Mill & Quarry, vol. 30, no. 7, Apr. 5, 1927, pp. 27–30, 7 figs. Company at Azusa, Cal., has effected economies by installation of new machinery, particularly elevating and conveying equipment, for its distributing bunkers.

MEASURING INSTRUMENTS

Spring-Operated. Comtor Measuring and Inspecting Instruments. Am. Mach., vol. 66, no. 19, May 12, 1927, pp. 795–796, 5 figs. Interchangeable system of diameter control for use in speeding up production measuring and checking; to this end line of measuring instruments has been developed of automatic spring-operated type, in which gaging or contact surfaces are applied to reference standard and to work in progress by uniform spring pressure so as to eliminate human factor in measuring.

MECHANISMS

Dial-Feed. Self-Contained Automatic Dial Feed, V. Arkin. Machy. (N. Y.), vol. 33, no. 10, June 1927, pp. 733–735, 2 figs. In this design, necessary indexing and locking movements are obtained by very simple means through self-contained mechanism which can be mounted on press or removed from it quickly, without drilling holes in press or attaching

connecting rods, levers, or other operating parts, to crankshaft.

Torque Amplifier. Bethlehem Torque Amplifier. Am. Mach., vol. 66, no. 21, May 26, 1927, pp. 895–897, 6 figs. Device for controlling accurately with small expenditure of energy various types of mechanical motions.

METAL DRAWING

Hollow Vessels. The Drawing of Hollow Vessels (Der heutige Stand der Technik des Hohlgefässziehens), R. Wittlinger. Maschinenbau, vol. 6, nos. 6 and 7, Mar. 24 and Apr. 7, 1927, pp. 265–270 and 335–339, 34 figs. Nature of drawing process; different types of drawing presses; means of increasing efficiency of double-acting drawing presses; spring-compression apparatus in single-acting press; multiple rotary press; multiple-stage press with revolving plates and roller feed; pneumatic drawing apparatus and its field of application.

METAL WORKING

Equipment. 44 Per Cent of all Metal Working Equipment Is at Least Ten Years Old, W. E. Irish. Am. Mach., vol. 66, no. 19, May 12, 1927, pp. 759–764. Summary analyzes types of machines by per cent of total in use in 16 combined divisions; provides counts of old equipment by divisions and shows total of approximately 414,000 machines that have seen ten years or more of active service in divisions studied.

Machine-Shops and Foundries. Largest Group of Users of Metal-Working Machinery. Am. Mach., vol. 66, no. 18, May 5, 1927, pp. 731–732, 2 figs. Manufacturers of machine shop and foundry products and equipment use many more metal-working machines than any other division in metal-working field.

Screw Machines. Press Work a Factor in Production on Screw Machines. Am. Mach., vol. 66, no. 16, Apr. 21, 1927, pp. 647–648. Presents table of metal-working machines in screw-machine products plants.

METALS

Cold Working. Influence of Cold Working on Speed of Evaporation (Ueber die Beeinflussung der Verdampfungsgeschwindigkeit durch Kaltbearbeitung mit einer Notiz über die Schmelz und Umwandlungspunkte kaltbearbeiteter Metalle), F. Sauerwald, H. Patalong and H. Rathke. Zeit. für Physik, vol. 41, no. 4–5, Feb. 14, 1927, pp. 355–377, 1 fig. Contains note on fusion and transformation points of cold-worked metals; kinetic theory of cold working and recrystallization.

Creep. Some Observations on the Creep of Metals, D. Hanson. Metallurgist (Supp. to Engineer), Apr. 20, 1927, pp. 54–56. Refers to paper by R. W. Bailey read before Inst. of Metals in March 1926, on mechanism of creep; preliminary results of present author's research into creep of metals, carried out with view to ascertaining effect of creep on properties of material; material selected was pure aluminum sheet; most important observation is considerable degree of strain hardening which occurred in method during process of creep.

Non-Ferrous. See NON-FERROUS METALS.

Strain Hardening. Strain Hardening of Metal Materials under Tensile and Pressure Tests (Die Verfestigung metallischer Werkstoffe beim Zug- und Druckversuch), F. Körber and H. Müller. Mitteilungen aus dem Kaiser-Wilhelm-Institut für Eisenforschung zu Düsseldorf, vol. 8, no. 12, 1926, pp. 179–199, 32 figs. Tests to determine strain hardening through tensile tests on metals, ingot steel and mixed-crystal alloys; determination of strain hardening by compression tests on lead, aluminum, copper. Bibliography.

MILLING MACHINES

Twin Overarms. Double Overarms and Cutting Efficiency. Brit. Machine Tool Eng., vol. 4, no. 44, Mar.-Apr., 1927, pp. 570–573, 6 figs. Tests of two machines with single and double overarms respectively; shows increase in cutting efficiency of milling machines obtained by use of twin overarms.

MOLDING MACHINES

Permanent. Moulding Machines for Cast Iron, I. W. Hinchley. Chem. Age, vol. 16, no. 409, Apr. 30, 1927, pp. 421–423. Describes plant used by Holley Carburetor Co., of Detroit, for making of small castings of cast iron in permanent cast-iron molds on rotating platform. Abstract of paper read before Soc. Chem. Industry.

MOLDING METHODS

Sand Molding. Sand Moulding Practice, J. D. Nicholson. Foundry Trade Jl., vol. 35, no. 557, Apr. 21, 1927, pp. 339–342, 13 figs. Deals with essential molding principles it is necessary to perform correctly and ill effects produced if they are not followed; ramming; venting; dried molds; runners.

MOLDS

Water-Cooled. Water-Cooled Moulds. Metallurgist (Supp. to Engineer), Apr. 20, 1927, pp. 56–58, 5 figs. Two important factors influencing quality of ingots are behavior of mold and process of solidification; refers to work by Junker in Zeit. für Metallkunde, Oct. 1926, with special reference to brass casting; important field of application for water-cooled mold lies in casting of large aluminum-alloy ingots.

MOTOR BUSES

Design. The Design of Motor Buses (Aménagement technique de l'autobus), M. Chauchat. Industrie des Voies Ferrées et des Transports Automobiles, vol. 21, no. 243, Mar. 1927, pp. 157–166, 5 figs. Notes on chassis, transmission, engine, cooling, carburetors, fuels, lubrication, bearings, suspension, wheels, tires, etc.

Gasoline-Electric. The Gasoline-Electric as a Transportation Unit. Bus Transportation, vol. 6, no. 5, May 1927, pp. 251–253, 3 figs. After two years use by Capitol District Transportation Co. serving Albany, Troy, etc., of electric drive, main advantages are said to be (1) general indorsement by public; (2) easier work for drivers and (3) faster schedules on difficult hillside routes.

Urban and Interurban. Urban and Interurban Buses, B. I. Budd. Am. Soc. Civ. Engrs.—Proc., vol. 53, no. 5, May 1927, pp. 813–818. In city service motor coach has its greatest economic value when operated in conjunction with electric railways; in suburban and interurban fields it is most useful for comparatively short hauls of 20 miles or less; cost of operating motor-coach service is greater than that of rail service and is always likely to be so; railway operators, with their special training and experience, are best qualified to operate motor coaches and coördinate them with railways.

MOTOR-TRUCK TRANSPORTATION

Merchandising. Merchandising Motor-Truck Transportation, C. S. Lyon. Soc. Automotive Engrs.—Jl., vol. 20, no. 5, May 1927, pp. 582–586 and (discussion), 586–588, 4 figs. Details of garage and shop facilities and automotive equipment of haulage company with which author is connected; economical location, construction and arrangement of garage is important feature; use of dynamometer for testing overhauled engines. Discussion of paper centers mainly around advantages of use of dynamometer and triple tires; cost and possible economy of duralumin body; effect on maintenance cost of overloading vehicles 100 per cent, and probably effect on profits at present haulage rates.

MOTOR TRUCKS

Axleless. Four-Wheel Driving, Steering and Braking. Motor Transport, vol. 44, no. 1153, Apr. 18, 1927, pp. 459–462, 6 figs. Holverta-Vulcan "axleless" road and cross-country chassis; high road speed coupled with ability to travel over unmade surfaces.

Six-Wheel. Subsidy Six-Wheeler Requirements. Motor Transport, vol. 44, no. 1155, May 2, 1927, pp. 527–530, 5 figs. Principal conditions to be fulfilled by medium-type six-wheeled vehicles to be eligible for enrolment under (British) War Department's subsidy scheme.

N

NICKEL STEEL

Instability. The Cause of Instability of Nickel Steel (La cause de l'instabilité des aciers au nickel), C. E. Guillaume. Archives des Sciences Physiques et Naturelles, vol. 9, no. 5, Jan.-Feb. 1927, pp. 5–15, 5 figs. Criterion of instability; action of carbon, manganese, copper and chromium; shows that in order to stabilize nickel steel it is necessary to hinder formation of cementite by combining carbon with substance to which it has stronger affinity than iron, such as tungsten and vanadium.

NON-FERROUS METALS

Corrosion. The Atmospheric Corrosion of Metals. Engineer, vol. 143, no. 3717, Apr. 8, 1927, pp. 374–376. Review of second experimental report to Atmospheric Corrosion Research Committee of Brit. Non-Ferrous Metals Research Assn.; deals with indoor and open-air exposure tests, former including associated laboratory experiments.

Molten Solder, Attack of. The Attack of Molten Metals on Certain Non-Ferrous Metals and Alloys, H. J. Hartley. Engineering, vol. 123, no. 3194, Apr. 1, 1927, pp. 399–403, 16 figs. Metallographic examination of unstressed brasses attacked by molten tin at 300 deg. cent.; tensile tests on materials under tin and solder attack; experiments on copper and brass wire; concludes that tin content of solder seems of greatest importance in determining its attacking power. Paper read before Inst. of Metals.

Segregation. The Mechanism of Inverse Segregation in Alloys, R. Genders. Engineering, vol. 123, nos. 3193 and 3194, Mar. 25 and Apr. 1, 1927, pp. 370–372 and 405–406, 14 figs. Deals chiefly with non-ferrous alloys which are usually cast in molds smaller than those used for steel and which solidify with relatively great rapidity; common type of heterogeneity is segregation outwards of lower melting constituent of alloy, in contradiction of results which would be predicted by equilibrium diagram; phenomenon has been termed inverse segregation or liquation; reviews present theories and suggests directions in which data essential for completion of general theory might be sought. Paper read before Inst. of Metals.

O

OIL ENGINES

Deutz. Tests on a Deutz Airless-Injection Heavy-Oil Engine (Versuche an einer Einspritz-Viertakt-Dieselmaschine der Motorenfabrik Deutz A.-G.), P. Langer. Werft—Reederei—Hafen, vol. 8, no. 7, Apr. 7, 1927, pp. 144–148, 13 figs. Results of independent tests made by author on six-cylinder four-stroke cycle engine suitable for both land and marine work; tests made were chiefly to determine fuel consumption at various loads, whole of results being laid off in special diagram having for base time of day; whole of results in this type of presentation are thus chronologically related; investigates variation of exponent of expansion line in indicator diagrams taken. See brief translated abstract in Mar. Engr. & Motorship Bldr., vol. 50, no. 597, May 1927, p. 197.

Energy Diagram. A Characteristic Energy Diagram for an Oil Engine and the Marine Oil Engine Trials, W. E. Dalby. Shipbldg. & Shipg. Rec., vol. 29, no. 15, Apr. 14, 1927, pp. 424–431 and (discussion) 449–450, 7 figs. Exposition of principles on which diagram is based; shows application of diagram to data given in tables in several reports of the committee; comparison of results. Abstract of paper read at Instn. Nav. Architects. See also Engineer, vol. 143, no. 3718, Apr. 15, 1927, pp. 420–422, 9 figs.; and Engineering, vol. 123, nos. 3195 and 3196, Apr. 8 and 15, 1927, pp. 414–417 and 467–469, 11 figs.

European Practice. Speed and Weight, Issues in Oil Engine Design, F. Johnstone-Taylor. Power Plant Eng., vol. 31, no. 9, May 1, 1927, pp. 514–516, 4 figs. Recent Europeans designs show trends toward increased speeds and decreased weights in oil-engine practice.

Foundations. The Construction of Oil Engine Foundations, V. L. Maleev. Oil Engine Power, vol. 5, nos. 3, 4 and 5, Mar., Apr. and May 1927, pp. 175–180, 247–249 and 325–327, 33 figs. Exhaustive data on sizes, weights, materials of concrete and masonry foundations.

Ice Plants. Increasing Profits by Oil Engine Drive, E. J. Kates. Power House, vol. 21, no. 8, Apr. 20, 1927, pp. 27–30. Author shows from analysis of costs that under certain conditions oil engine is more economical and reliable than any other source of power for manufacture of ice.

Maintenance. Cost of Oil-Engine Maintenance, E. J. Kates. Power, vol. 65, no. 21, May 24, 1927, pp. 779–781. Discussion of what repair costs should be; outline of proper way to figure maintenance; why some plants have heavy repairs.

Merchant Marine. Development of Merchant Marine Oil Engines by Krupp Germania Shipyard Corp. (Die Entwicklung des Handelsschiffs-Oelmaschinenbaues bei der Fried. Krupp Germaniawerft Aktiengesellschaft), Kruppsche Monatshefte, vol. 8, Mar. 1927, pp. 49–59, 18 figs. Reviews development of two-stroke engine with valve atomization, with details of improvements made.

Operation. Averting Trouble in Oil Engine Operation. Power House, vol. 21, no. 8, Apr. 20, 1927, pp. 33–35, 2 figs. Valuable hints are given on operation of oil engines, prevention of trouble, methods of detecting and overcoming it when it does develop, and effect on power costs.

Solid-Injection. Large Oil Engine on Production Basis. Oil Engine Power, vol. 5, no. 5, May 1927, pp. 302–305, 5 figs. One of largest types of 4-cycle, solid-injection engines designed and built in United States in shops of De La Vergne Machine Co.

OIL FUEL

Burners. Oil Burners for House Heating. Sibley Jl., vol. 41, no. 4, Apr. 1927, pp. 118–120 and 132. Types of burners; combustion; selecting burners; cost of heating with coal and oil.

World's Future Supply. The World's Future Supplies of Liquid Fuels, J. B. C. Kershaw. Engineer, vol. 143, nos. 3712, 3713, 3714, 3715 and 3716, Mar. 4, 11, 18, 25 and Apr. 1, 1927, pp. 244–245, 261–263, 292–294, 316–317 and 344–345, 3 figs. Describes various processes that have been employed, either in laboratory or upon commercial scale, for production of liquid fuels, and latest information relating to their industrial exploitation and progress. Mar. 4: Low-temperature carbonization processes. Mar. 11: Low-Temperature Carbonization Company's plant at Barugh; Midland Coal Products plant at Netherfield; Markham process and retort; Maclaurin process and plant at Glasgow; American and German processes; thermal balance for low-temperature-carbonization processes. Mar. 18: Production of oils from coal by Bergius process. Mar. 25: Processes for production of methanol and other alcohols from coal; Fischer and Tropsch process for synthetic production of mixtures of higher alcohols. Apr. 1: Synthesis of liquid fuels from vegetable and other oils and from cellulose.

OPEN-HEARTH FURNACES

100-Ton. The Design of 100-Ton Open-Hearth Furnaces (Dimensions des fours Martin de 100 tonnes), A. Pavloff. Revue de Métallurgie, vol. 24, no. 1, Jan. 1927, pp. 1–9. Results of author's investigations and calculations; dimensioning of hearth surface; gas and air burners; recuperators; valves, flues and stack. Translated from Russian.

Recuperators. Recuperators Applied to Open-Hearth Furnaces, W. H. Fitch. Engr's. Soc. West. Pa.—Proc., vol. 42, no. 10, Jan. 1927, pp. 506–517 and (discussion) 517–530, 7 figs. Use of recuperator, in combination with regenerators; use of screen or checker chamber before recuperator is desirable for purpose of removing oxide and dust; corebusters are employed to compel air to pass in contact with wall of tube; they consist of solid cylinders made of fireclay; how construction of recuperator influences results as to uniformity of temperature of combustion air leaving recuperator; in applying principle of author's design of recuperator to open-hearth furnace for manufacture of steel, only limitation appears to be quantity, temperature, and nature of dust that may be deposited on tubes.

ORDNANCE

Compensators. The Cutts Compensator, P. P. Quayle. Army Ordnance, vol. 7, no. 41, Mar.-Apr. 1927, pp. 354–357, 5 figs. This is device to be attached to muzzle of small arms or ordnance for purpose of overcoming tendency to "time" or reducing kick and holding muzzle down; tests of compensators; effect of compensator on muzzle velocity and accuracy.

OXYACETYLENE WELDING

Aluminum Sheet. Welding Pure Aluminum Sheet. Oxy-Acetylene Tips, vol. 5, no. 10, May 1927, pp. 188-191, 10 figs. Wide use of this material furnishes opportunities for fabricating special equipment.

Applications. A Résumé of the Fields of Application of Oxy-Acetylene Welding and Cutting, D. S. Lloyd. Iron & Steel of Canada, vol. 10, no. 4, Apr. 1927, pp. 102-106, 11 figs. Describes only those applications of process that have been very successful in reducing costs in commercial field.

Locomotive Side Rods. Cutting Side Rods with Acetylene Torch, F. H. Williams. Can. Machy., vol. 18, no. 16, Apr. 21, 1927, pp. 22-23, 7 figs. Shows results, good and bad, of cutting steel side rods of locomotives by this method, such rods being medium steel forgings, with carbon running from 0.25 to 0.55 per cent, but not higher carbon or alloy steels.

Plate. Welding Plate of Medium Thickness. Acetylene Jl., vol. 28, no. 11, May 1927, pp. 521-524, 9 figs. Exercises suggested for training new welders in fundamental principles of welding materials used in fabrication of thin-walled tanks, extracted from book by R. Granjon, P. Rosenberg and A. Desgranges, of Paris.

Storage Tanks. Oxyacetylene-Welded Construction of a Large High-Pressure Storage Tank, H. E. Rockefeller. Mech. Eng., vol. 49, no. 5, May 1927, pp. 405-411, 20 figs. Design of tank; selection of material; checking of welders; welding longitudinal and girth seams; design of new manhole reinforcing ring and its welding to manhead.

Torch Manipulation. Proper Use of Welding Torch, E. Louden. Brass World, vol. 23, no. 4, Apr. 1927, pp. 113-114, 4 figs. Hints about its manipulation and care; preheating for welding brass, aluminum and sheet metal; qualifications of welder.

P

PIPE

Flanges. The Strength of Pipe Flanges, E. O. Waters and J. H. Taylor. Mech. Eng., vol. 49, no. 5a, Mid-May 1927, pp. 531-542, 29 figs. Approximate methods of determining strength; proposed formulas for strength and deflection of rings; recommended proportions of flat rings; proposed method for determining strength and deflection of hubbed flanges; tests on hubbed flanges; recommended proportions of hubbed flanges.

PIPE, CAST-IRON

Bronze Welded. Temperature and Bending Strains in Bronze Welded C. I. Pipe Lines, E. Hering, F. G. Outcalt and T. W. Greene. Gas Age-Rec., vol. 59, no. 19, May 7, 1927, pp. 659-660, 3 figs. Necessity of careful laying procedure and desirability of expansion joints at 100-ft. intervals.

PLANERS

Alignment. Testing the Alignment of a Planer, A. Nield. Machy. (Lond.), vol. 30, no. 759, Apr. 28, 1927, pp. 119-120, 4 figs. Simple tests which can be carried out without use of very elaborate apparatus.

Crank. A New Openside Crank Planer. Brit. Machine Tool Eng., vol. 4, no. 44, Mar.-Apr., 1927, pp. 575-577, 3 figs. Manufactured by Butler Machine Tool Co.; permits convenient planing of bulky irregular pieces and provides capacity for unusual emergency jobs.

POWER TRANSMISSION

Shafting. Code for design of Transmission Shafting. Mech. Eng., vol. 49, no. 5, May 1927, pp. 474-476. Covers: (1) designing formulas for cases most frequently met in design of transmission shafting; and (2) diagrams for use in designing shafting.

PRESSES

Safety Code. Safety Code for Power Presses and Foot and Hand Presses. U. S. Bur. Labor Statistics—Bul., no. 430, Dec. 1926, pp. 1-62, 63 figs. Purpose of code is to provide reasonable safety for life, limb and health.

PRESSURE VESSELS

Design. The Design and Construction of Pressure Vessels, L. J. Sforzini. Power, vol. 65, nos. 17 and 18, Apr. 26 and May 3, 1927, pp. 623-625 and 670-674, 11 figs. Fundamental principles; cast and riveted construction; modern practice in seamless and welded construction.

PRINTING MACHINERY

Electric Drive. Electricity in the Modern Newspaper Plant, H. C. Jorstad. Elec. Jl., vol. 24, no. 5, May 1927, pp. 194-198, 10 figs. Equipment of plant of Pittsburgh Press Publishing Co.; power comes into this plant at 4000 volts, 3-phase, 60 cycles from lines of Duquesne Light Co.; mechanical processes; press-motor control.

PULVERIZED COAL

Ash Precipitation. Catching Pulverized Coal Ash at the Trenton Channel Plant, H. M. Pier and A. N. Crowder. Power, vol. 65, no. 22, May 31, 1927, pp. 834-837, 6 figs. Gas from three boilers enters one stack, passing through two precipitators, each treating gas from $1^1/_2$ boilers; before reaching Cottrells, gas has passed through economizers, so that its temperature in precipitator is about 350 deg. to 400 deg. fahr.

Boiler Firing. The Lopulco System of Boiler Firing with Pulverized Fuel, J. R. C. Shepherd. Min. Mag., vol. 36, no. 4, Apr. 1927, pp. 215-218, 3 figs. Account of system and installation of plant in London.

Equipment. Pulverized Fuel, R. B. Potter. Engineer, vol. 143, no. 3716, Apr. 1, 1927, pp. 362-363, 3 figs. Deals with apparatus for preparation of fuel and that for combustion. Abstract of paper read before Instn. Mech. Engrs.

PUMPS

Rotary. Investigations of a Rotary Pump (Untersuchungen an einer Kapselpumpe), S. Kiesskalt. V.D.I. Zeit., vol. 71, no. 14, Apr. 2, 1927, pp. 453-456, 12 figs. Testing method is developed, measuring results of which permit separation of internal losses and their presentation in relation to operating conditions; describes rotary pump with 3-dimensional lifting action; bearing and lubricating conditions of such machines.

PUMPS, CENTRIFUGAL

Borehole. Notes on the Application of Sulzer Centrifugal Borehole Pumps. Sulzer Tech. Rev., no. 1, 1927, pp. 8-10, 10 figs. In consequence of constantly increasing use of subsoil water for public water supply, centrifugal pump has found large field of application for raising water from boreholes; to suit special conditions of working required, type of pump has been constructed, with driving motor installed at ground level, while pump itself hangs freely in borehole on pipe which serves as rising main.

Fire. Report of Committee on Fire Pumps. Nat. Fire Protection Assn.—Advance Paper, 1927, 6 pp. Water passages of centrifugal pumps; gasoline-engine driving of centrifugal pumps; electric driving and control of pumps.

R

RAILS

Corrugation Removal. The Treatment of Rail Corrugations. Tramway & Ry. World, vol. 61, no. 19, Apr. 14, 1927, p. 199, 1 fig. Essanee rail grinder was designed by practical tramway engineer to meet requirements of his own system.

Joints, Welded. Committee on Welded Rail Joints—Progress Report No. 5—July 1926, Am. Welding Soc.—Jl., vol. 6, no. 3, Mar. 1927, pp. 12-72, 38 figs. Summary of tests and reports; shear tests. Report on Longitudinal Shearing Tests of Rail Plate Welds, R. J. Fogg; analysis of results of shear tests giving highest values; Comments on Shear Test Results, H. L. Whittemore; telemeter investigations; report on preliminary tests of welded rails, Baltimore, Aug. 2-3, 1926; Program of additional investigations proposed by Committee; suggested program for strain gage measurements of welded rail joints.

RAILWAY MOTOR CARS

Gasoline. Gasoline Rail Car for Frisco. Ry. Mech. Engr., vol. 101, no. 5, May 1927, pp. 268-269, 4 figs. New Sykes 275-hp. mechanical-drive car develops high tractive force in low gear.

Gasoline-Electric. Rock Island Adds to Its Power Rail Car E uipment. Ry. Age, vol. 82, no. 22, Apr. 30, 1927, pp. 1333-1335, 5 figs. Seven new units burn distillate; two, developing 550 hp. each, serve as motive power in light passenger and freight service.

Service. Motor Rail Car Service on B. & M. Ry. Mech. Engr., vol. 101, no. 5, May 1927, pp. 301-303. Each car in operation receives daily 4 hours service attention from locomotive mechanics especially trained for this class of work.

RAILWAY REPAIR SHOPS

Cars. Repairing Steel Cars on the Lehigh Valley. Ry. Mech. Engr., vol. 101, no. 5, May 1927, pp. 280-285, 14 figs. Location of shops on system facilitates handling repairs to suit traffic requirements.

Locomotive. Santa Fe Repairs Handled with Modern Equipment, F. W. Curtis. Am. Mach., vol. 66, nos. 16 and 17, Apr. 21 and 28, 1927, pp. 661-663 and 683-685, 17 figs. Apr. 21: Methods and equipment at Albuquerque, N. M., shops; stripping and erecting locomotives; reboring worn cylinders; machining truck pins, driving boxes, connecting-rod bushings, studs and connecting rods. Apr. 28: Tool room equipped with heat-treating units of modern design; grinding operations; equipment for flanging and trepanning flue sheets.

RAILWAY SIGNALING

Automatic Block. Committee IV—Direct Current Automatic Block Signaling. Am. Ry. Assn., Signal Sec.—Proc., vol. 24, no. 4, Apr. 1927, pp. 646-658. D.c. vibrator crossing bell; minimizing effect of lightning and foreign current on d.c. track circuits; prevention of sweating of relays.

Committee VIII—Alternating Current Automatic Block Signaling. Am. Ry. Assn., Signal Sec.—Proc., vol. 24, no. 4, Apr. 1927, pp. 726-731. Rectifiers for signal systems; protection from lightning.

Colored-Light Signals. Visability of Light Signals in Daylight. (Die Sichtbarkeit von Lichtsignalen bei Tage), L. Bloch. Licht u. Lampe, no. 7, Apr. 7, 1927, pp. 239-242, 3 figs. Discusses problem of light signals in daylight which, in author's opinion, require further investigation; results of tests carried out by Osram Corp.; influence of shade of color on visability.

Power Interlocking. Committee III—Power Interlocking. Am. Ry. Assn., Signal Sec.—Proc., vol. 24, no. 4, Apr. 1927, pp. 711-720. Automatic crossing protection at railway crossings.

Rayon

Economic and Technical Properties. Artificial Silk (Die Kunstseide in Technik und Wirtschaft), P. Krais. Technik u. Wirtschaft, vol. 20, no. 4, Apr. 1927, pp. 98-103, 4 figs. Historical develpmenot; review of different processes; world production; relation to other textile fabrics; technical properties; quality of German artificial silk.

Manufacture. Artificial Silk and Its Manufacture (Om konstsilke och dess tillverkning), N. W. Hörstaius. Teknisk Tidskrift (Allmänna Avdelningen), vol. 57, nos. 9 and 10, Mar. 5 and 12, 1927, pp. 65-69 and 74-77, 19 figs. Describes different processes, including nitrocellulose; copper-oxide-ammonium, viscose and cellulose acetate; with special reference to viscose process, which is most universally used.

REFRACTORIES

Checker Brick. The Use of Super-Refractories as Checker Brick in Gas Manufacture, H. J. Knollman. Am. Ceramic Soc.—Jl., vol. 10, no. 4, Apr. 1927, pp. 299-308. During past year, Carbofrax and Diamel brick, each having distinctly different but superior heat-transfer properties, as compared with firebrick, were tried out in full-sized standard single-shell oil-gas generator; it was hoped that increased gas-generating capacity would be obtained by their use, but such was not the case, chiefly because of influence of other factors having as much bearing on generator capacity as checker brick; with development of improvements in generators and correction of some of these difficulties, there appear to be excellent possibilities in use of brick of superior heat-transfer properties in promoting operating efficiencies and in increasing gas production.

Metal Furnaces. Refractory Materials for Metal Furnaces, W. J. May. Mech. World, vol. 81, no. 2101, Apr. 8, 1927, p. 253. For crucible and other furnaces melting up to, and including, cast iron, good fireclay bricks with fireclay jointing will be found sufficiently refractory and durable, as heat of less than 2500 deg. fahr. is needed, but over this it is desirable to have something better.

Spalling. The Spalling of Refractory Materials, A. T. Green and A. J. Dale. Ceramic Soc.—Trans., vol. 25, part 4, 1925-1926, pp. 428-470, 3 figs. Reviews experimental data already put forward by numerous workers, in light of recent experimental work by present authors; analyzes entire problem with object of deriving indications of special importance from structural, manufacturing and testing viewpoints. Bibliography.

Steel-Furnace. Corrosion of Steel Furnace Refractories, A. Scott. Ceramic Soc.—Trans., vol. 25, part 4, 1925-1926, pp. 339-351, 2 figs. Describes normal types of corrosion.

Thermal Properties. The Thermal Properties of Refractory Materials and a Consideration of the Factors Influencing Them, A. T. Green. Ceramic Soc.—Trans., vol. 25, part 4, 1925-1926, pp. 361-385, 7 figs. Specific heat of refractory materials; heat capacity per unit volume; temperature diffusivity; thermal conductivity and emissivity of firebrick surfaces. Bibliography.

REFRIGERATION

Gas. Refrigeration by Gas, J. A. Whittington. West. Soc. Engrs.—Jl., vol. 32, no. 3, Mar. 1927, pp. 107-114, 2 figs. Enumerates principal methods of refrigeration with short description of each and gives details of typical system utilizing cycle in which refrigerating action is made possible by use of heat.

Household. Household Refrigeration, A. Philipp and C. C. Spreen. Refrig. Eng., vol. 13, no. 10, Apr. 1927, pp. 301-305 and (discussion) 306-309, 8 figs. Standard tests for household refrigerating compressors.

RIVETS

Split and Tubular. Split and Tubular Rivets. Soc. Automotive Engrs.—Jl., vol. 20, no. 5, May 1927, p. 558, 6 figs. Proposed dimensional specification for approval as S.A.E. recommended practice.

ROLLING MILLS

Dynamic Problems. Dynamic Conditions in Connection with Rolling (Nagra dynamiska förhallanden vid valsning), S. Ekelund. Jernkontorets Annaler, vol. 111, no. 2, 1927, pp. 39-106, 16 figs. Author seeks to establish formulas for power requirements and other conditions in rolling; presents theoretical calculations.

Electric Drive. Electric Rolling-Mill Drives. Elec. World, vol. 89, no. 20, May 14, 1927, pp. 1014-1016, 4 figs. Where d.c. and a.c. motors are most desirable; recent combinations and methods of securing flexible control.

Electrification of Sheet Mills, J. S. Murray. Iron & Steel Engr., vol. 4, no. 4, Apr. 1927, pp. 173-193, 38 figs. Details of Toronto Works of Follansbee Brothers Co., engaged in manufacture of "Follansbee Forge" full finished sheets, in gages ranging from 10 to 24, and in sizes up to 48 in. wide and 144 in. long; details of power plant; bar-mill reversing equipment; open-hearth department; ingot furnaces and bar mill; powdered-coal plant; departmental organization.

The Application of Direct Current Motors to Main Roll Drives, H. A. Winne. Iron & Steel Eng., vol. 4, no. 4, Apr. 1927, pp. 194-202, 10 figs. Geared vs. direct connected drives; flywheels; ventilation; methods of speed adjustment; mill-type motor construction; control and switchboard; magnetic-control equipment; continuous mill with individually driven stands is responsible for notable increase in use of d.c. motors for mail roll drives.

Merchant. The Rolling of Commercial Iron and Small Sections (Le laminage des fers marchands et des petits profiles), E. Poncelet. Revue de Métallurgie, vol. 24, no. 3, Mar. 1927, pp. 109-123, 26 figs. Describes methods and equipment; shearing machines; cooling beds; rolling of T-iron, angle, channel, flat and round iron, etc.

Rod and Wire. New Features are Incorporated in Tidewater Rod and Wire Mill, G. A. Richardson. Iron Trade Rev., vol. 80, no. 18, May 5, 1927, pp. 1151-1154, 6 figs. New mill placed in operation at

Sparrows Point, Md., division of Bethlehem Steel Co.; rod mill is entirely gear-driven.

Steel Ingots. Rolls Steel Ingot Weighing 63,000 Lb. Iron Age, vol. 119, no. 19, May 12, 1927, pp. 1376–1377, 2 figs. Slabs 130 in. wide and 8¼ in. thick, for fabrication into gear-reduction unit flywheels, produced on 206-in. plate mill.

Welding and Cutting in. The Maintenance of Rolling Mill Machinery. Oxy-Acetylene Tips, vol. 5, no. 10, May 1927, pp. 194–204, 22 figs. Breakdown delays are minimized when welding and cutting flames are freely used; wabbler repairs; welding aluminum bronze; pinion repairs.

ROLLS

Chilled. Chilled Roll Making. Foundry Trade Jl., vol. 35, nos. 555 and 557, Apr. 7 and 21, 1927, pp. 293–294 and 335–336. Apr. 7: Broader metallurgical aspects; current practice; nature of charge; furnaces; working charge; casting temperature. Apr. 21: Future prospects; factors affecting chill; economies to be effected; gas firing; pulverized fuel; suggested duplex process.

Pinching. Pinching of Rolls (Walzenschärfen), H. Cramer. Stahl u. Eisen, vol. 47, no. 14, Apr. 7, 1927, pp. 582–586, 10 figs. Increasing rolling efficiency by pinching of rolls; pinching designs; relation between speed of rolls and overrolling.

S

SAND, MOLDING

Mixers. A Foundry-Sand Renovating Machine, Etc. Mech. World, vol. 81, no. 2101, Apr. 8, 1927, p. 252, 2 figs. Novel type of sand-mixing machine manufactured by Pneulec, Ltd., intended chiefly for rapid renovation of sand already used, and particularly suited to work in foundries where sand is required for fresh mold directly it has been knocked out of a previous one.

Research. Recent Foundry Sand Research, T. C. Adams. Sibley Jl., vol. 41, no. 4, Apr. 1927, pp. 111–117, 130 and 136, 8 figs. Review of research being conducted under direction of American Foundrymen's Assn., including study of properties of sand; testing methods and apparatus; permeability and strength tests.

Strength. The Strength of Moulding Sands, J. G. A. Skerl. Brit. Cast Iron Research Assn.—Bul., no. 16, Apr. 1927, pp. 10–13. Deals briefly with this subject, as well as relation of strength to other properties of molding sands, and also to its treatment in foundry.

SAW MILLS

Design. Problems of Wood-Working. Eng. Progress, vol. 8, no. 4, Apr. 1927, pp. 99–101, 7 figs. Two points are of greatest importance in layout of saw mills; first is to provide appropriate appliances for bringing along timber to be worked, and second consists in using machines possessing highest possible cutting velocities.

SAWS

Hot, Direct-Connected. Direct Connected Hot Saws, N. D. Cooper. Iron & Steel Engr., vol. 4, no. 4, Apr. 1927, pp. 202–204, 2 figs. Eliminates use of belt with its inherent ills, and resulting compact and efficient units obtained, indicates that future tendency will be to adopt this form of construction.

Link-Type. "Wolf" Portable Link-Type Sawing Machine. Am. Mach., vol. 66, no. 19, May 12, 1927, pp. 796–797. Designed by Reed-Prentice Corp., Worcester, Mass., for use in construction work and various sawing operations about plant.

SEMI-DIESEL ENGINES

Applications. Application of the Semi-Diesel Oil Engine, E. W. Thompson. Can. Engr., vol. 52, no. 17, Apr. 26, 1927, pp. 457–459, 4 figs. Various purposes for which this type of engine has been successfully employed; principal characteristics; operating features; values of fuel oils; fuel-consumption tests.

SHAFTS

Whirling Speeds. A Graphical Method for Determining the Whirling Speeds of Loaded Shafts, H. H. Jeffcott. Lond., Edinburgh and Dublin Philosophical Mag. & Jl. of Science (Supp. no.), vol. 3, no. 16, Apr. 1927, pp. 689–713, 4 figs. Account of graphical method by which whirling speeds of shafts may be approximately determined in simple and rapid manner; method is not to be confused with that by which deflection of loaded shaft may be determined graphically by use of bending-moment diagram.

SHEET METAL

Annealing. New System Flat-Pack Sheet-Annealing Process. Iron & Coal Trades Rev., vol. 114, no. 3085, Apr. 15, 1927, p. 606, 3 figs. It is claimed that with this system difficulties are eliminated, while it is possible with flat pack, under satisfactory conditions of efficiency and minimum handling costs, to obtain heating surface as high as 30 sq. ft. per ton of sheets; main advantages claimed for system are summarized.

Rolling. Recent Developments in the Rolling of Sheet Steel. Mech. Eng., vol. 49, no. 5, May 1927, pp. 451–454, 2 figs. Particulars regarding process of rolling steel sheets; application of continuous principle to sheet rolling, and increased production and savings possible through its adoption.

SILICA BRICK

Open-Hearth Furnaces. The Alteration of Silica Bricks in Open-Hearth Furnaces, E. Sieurin. Ceramic Soc.—Trans., vol. 25, part 4, 1925–1926, pp. 400–406. In order to obtain direct comparison under works conditions, sample bricks were built into one of side walls of open-hearth furnace hearth at Swedish steel mill; these bricks were particularly well burnt; at same time bricks, also of superior quality of German manufacture, were placed in walls of same furnace hearth; tests made by Höganäs show that, although softening point of bricks is about same as that of standard silica brick, resistance to corrosion by slag decreases owing to admixture of considerable quantity of ferric oxide.

SILICON STEEL

Structural. Structural Silicon Steel Has Special Properties, J. Meiser. Iron Age, vol. 119, no. 16, Apr. 21, 1927, p. 1146. Results of German open-hearth heats; of composition and physical tests; Bosshart and regular heats compared. Translated from Stahl u. Eisen, Mar. 17, 1927.

SPEED REDUCERS

Paper-Mill Types. Speed Reducers and Their Application. Paper Indus., vol. 9, no. 1, Apr. 1927, pp. 78–82, 19 figs. Types for pulp and paper-mill requirements.

SPRINGS

Hairsprings for Instruments. The Manufacture and Properties of Hairsprings, H. Moore and S. Beckinsale. Engineering, vol. 123, no. 3195, Apr. 8, 1927, pp. 439–440. Investigation at Research Department, Woolwich, into manufacture and properties of several types of hairsprings for instruments; related work, mainly of metallurgical nature, has also been carried out on small springs used for other pruposes.

SPRINGS

Helical. Failure of Helical Springs, F. C. Lea and F. Heywood. Engineering, vol. 123, nos. 3199 and 3201, May 6 and May 20, 1927, pp. 562–564 and 621–623, 13 figs. Failure of some steel wires under repeated torsional stresses at various mean stresses determined from experiments on helical springs. Paper read before Instn. Mech. Engrs.

Hysteresis of. Hysteresis Relative to the Operation of Mechanical Springs, J. K. Wood. Mech. Eng., vol. 49, no. 5a, Mid-May 1927, pp. 561–569, 20 figs. Springs and spring systems are shown to be associated with physical hysteresis of three characteristic types, mechanical, hypo-elastic and hyper-elastic hysteresis; former is shown to be important from standpoint of automotive riding quality; mechanical hysteresis is caused by external agencies, while both hypo-elastic and hyper-elastic hysteresis are caused by internal behavior of crystalline structures; hypo-elastic hysteresis is due to internal friction of solid type, while hyper-elastic hysteresis is due to slip or plastic flow and hence has characteristic time factor.

STANDARDS

German DIN Reports. Report of the German Industrial Standards Committee (DIN-Mitteilungen), vol. 6, no. 7, Apr. 7, 1927, pp. 361–368, 5 figs. Proposed tentative standards for screwed pipe joints and nuts, hook bolts and circular saw blades.

Report of German Industrial Standards Committee (DIN-Mitteilungen). Maschinenbau, vol. 6, no. 6, Mar. 24, 1927, pp. 305–320, 24 figs. Proposed tentative standards for tight fit, wringing fit, snug fit and shaft; production accuracy of gages; designation and uses of bronzes and copper; symbols for rivets and screws; rubber hose; metric threads; machine bases; steel wire; air ducts; etc.

STEAM

High-Pressure. Industrial Generation of High-Pressure Steam (La production industrielle de la vapeur d'eau à haute pression), C. Roszak and M. Veron. Société des Ingenieurs Civils de France—Bul., vol. 79, no. 11, Nov. 1926, pp. 1181–1260, 15 figs. Review of developments; field of application of high-pressure steam; power and efficiency of steam power plants; means of improving efficiency of steam cycle, and of increasing volume of heat which can be converted into work; Rankine cycle; influence of improvement of cycle on efficiency and power of steam generators.

Power Conservation and High-Pressure Steam Practice (Energiewritschaft und Hochdruckdampfbetrieb), Löffler, V.D.I. Zeit., vol. 71, no. 14, Apr. 2, 1927, pp. 437–447, 28 figs. Heat-economic prospects for gasification and liquefaction of coal; pulverized-coal firing; high-pressure steam generators.

STEAM ENGINES

Internal-Combustion vs. The Modern Steam Engine and Internal Combustion Motors, M. Demoulin. Engineer, vol. 143, nos. 3718, 3719, 3720 and 3722, Apr. 15, 22, 29 and May 13, pp. 402–403, 430–431, 472–473 and 518–519, 4 figs. Steam enjoys advantage of low exhaust temperature, thanks to use of condenser; internal-combustion engine, on contrary, has enabled engineers to raise considerably initial temperature with initial pressures higher than those for steam at 470 deg.; efficiency of internal-combustion engine would be higher if it were not necessary to cool by water circulation cylinder, their covers and pistons; Diesel engine derives its favor for ship propulsion from its economy in fuel and from suppression of boilers and stokers; author also points out disadvantages of internal-combustion engines, and then discusses advantages of steam engines, and improvements in production and utilization of steam.

Metallic Packing. The Britimp Metallic Packing. Engineering, vol. 123, no. 3194, Apr. 1, 1927, p. 403, 6 figs. on p. 402. Type of packing ring with which it is impossible to increase pressure on rod or shaft once it has been correctly adjusted and in which any want of alignment in moving parts is automatically provided for; manufactured by Brit. Metallic Packings Co.

Quadruple-Expansion. A New Type of Quadruple-Expansion Engine. Mar. Engr. & Motorship Bldr., vol. 50, no. 597, May 1927, pp. 174–177 and 191, 3 figs. Novel valve-gear arrangements adopted to simplify and shorten engine.

STEAM GENERATION

Electric. The Economic Production of Steam by Electricity, C. J. Wharton. Combustion, vol. 16, no. 5, May 1927, pp. 271–273. Shows that it is commercial and economic proposition, under certain circumstances, to generate steam by electricity; conditions required are very cheap current, all machinery in works electrically driven and yet quantity of live steam required for process purposes in mill or factory.

Low-Grade Fuel for. Discussion on the Utilisation of Low Grade Fuels for Steam Generation. Eng. & Boiler House Rev., vol. 40, nos. 9 and 10, Mar. and Apr. 1927, pp. 472–476 and 530–531. Discussion of paper read before Instn. of Fuel Economy Engrs. by W. F. Goodrich.

STEAM POWER PLANTS

Heat Balances. Heat Balances in Industrial Plants, C. A. Kelsey. West. Soc. Engrs.—Jl., vol. 32, no. 3, Mar. 1927, pp. 95–106, 7 figs. Question of purchased power vs. private plant is complicated in case of industry using heat in its processes, by possibility of generating power as by-product; describes number of such cases and shows that heat balance may be obtained that will bring greatest economy; data presented give idea how to make study of such plant to determine what should be done.

Industrial. Engineering Services at a Bristol Factory. Power Engr., vol. 22, no. 254, May 1927, pp. 167–176, 18 figs. New type of boiler and comprehensive electric power system are two out of several interesting features of works of J. S. Fry & Sons.

Sixty-Four Per Cent Less Coal per Pound of Product. Power, vol. 65, no. 19, May 10, 1927, pp. 692–696, 8 figs. Improved combustion, utilization of exhaust steam, installation of recording instruments and machines of proper capacity, together with simplified methods of production, effect annual saving of $175,000 in Union Plant Hercules Powder Co.

Laundries. Laundry Power Plant Increases Capacity 50 Per Cent with 10 Per Cent Less Steam. Power, vol. 65, no. 17, Apr. 26, 1927, pp. 618–620, 1 fig. Production increase of 50 per cent and coal saving exceeding 10 per cent are results of installation of sealed and balanced steam-supply and drainage system in new plant of American Linen Supply Co. in Chicago.

Oil Refineries. Using the Same Steam Three Times. Power, vol. 65, no. 20, May 17, 1927, pp. 732–737, 7 figs. Steam generated at 250-lb. gage is exhausted from impulse element of 1000-kw. turbine generator unit at 125-lb. pressure, is used to drive pumps, and is returned at 2-lb. gage pressure to low-pressure reaction element of turbine which exhausts to condenser; boilers are equipped with forced-draft chain grates, air preheaters and fin-tube side walls.

Steel Works. Minnequa Steel Works Installs New Power Plant, H. W. Neblett. Power Plant Eng., vol. 31, no. 9, May 1, 1927, pp. 494–501, 14 figs. Great plant of Colorado Fuel & Iron Co. at Pueblo, Colo., uses as fuel blast-furnace gas cleaned by electrostatic precipitators, with pulverized coal as auxiliary fuel, and operates turbo-generators and turbo-blowers.

Thermal Efficiency. Economic Limits in the Improvement of Thermal Efficiency (Die wirtschaftlichen Grenzen wärmetechnischer Verbesserungen), H. Queisser. Wärme, vol. 50, no. 10, Mar 11, 1927, pp. 181–183, 2 figs. Recent developments in power stations are characterized by number of improvements making for lower heat consumption per kw-hr.; general adoption of these developments is retarded, however, and will never reach stage which would be expected from thermal considerations alone, because, apart from questions of reliability, part of saving in heat is offset by higher capital cost of plant embodying various improvements; author develops general equation from which may be determined maximum amount that one can afford to spend on equipment which would effect any stated reduction in fuel consumption; less investment will then show net profit, whereas any higher investment would involve increase in total cost per kw-hr.; quadrant chart and alignment chart are presented for graphical solution of problems. See brief translated abstract in Power Engr., vol. 22, no. 254, May 1927, p. 195.

STEAM TURBINES

Blade Erosion. Tests on Erosion Caused by Jets, E. Honegger. Brown Boveri Rev., vol. 14, no. 4, Apr. 1927, pp. 95–104, 14 figs. Purely qualitative tests show that erosion increases rapidly with velocity; metals which resisted erosion at speed of 130 m. per sec. showed large holes after being tested at 200 and 225 m. per sec.; relation between resistance to erosion of rustless steel and heat treatment; comparison between rolled 5.0% nickel steel and drawn rustless chrome steel clearly showed superiority of former; tests on cast iron of various qualities showed that this metal offered smaller resistance to erosion than steel; characteristic erosion curves; influence of size of drops; relation between erosion and velocity; erosion and mechanical strength.

STEEL

Aging. The Aging of Mild Steel. Metallurgist (Supp. to Engineer), Apr. 20, 1927, pp. 49–50. Definition of aging; while it is clear that recovery of wrought iron and mild steel from plastic overstrain is intricate phenomenon of great importance, immediate question is whether it is this phenomenon which is described as aging in literature; further question arises as to what is meant by describing mild steel as free from aging.

Alloy. See ALLOY STEELS.

Chrome-Nickel. See CHROME-NICKEL STEEL

Chromium. See CHROMIUM STEEL.

High-Speed. See HIGH-SPEED STEEL.

Nickel. See NICKEL STEEL.

Silicon. See SILICON STEEL.

Temper Brittleness. Temper Brittleness of Steel (Discussion sur la fragilité de revenu). Revue de Métallurgie, vol. 24, no. 1, Jan. 1927, pp. 36–40. Discussion by A. Portevin and L. Brenet of article by L. Gillet and M. Ballay, published in same journal vol. 23, Sept. and Oct. 1926; and reply by authors. See reference to original article in Eng. Index, 1926, p. 713.

STEEL CASTINGS

Ni-Cr-Fe and Co-Cr-Fe. The Production and Uses of Ni-Cr-Fe and Co-Cr-Fe Castings, J. F. Kayser. Foundry Trade Jl., vol. 35, no. 558, Apr. 28, 1927, pp. 351–354, 4 figs. Present position of those alloys which are suitable for production of castings; consideration of their future; cast magnet; stainless alloys.

STEEL, HEAT TREATMENT OF

Rails. New Process for Heat Treatment of Steel Rails (Nouveauz traitments thermiques de l'acier à rails), Marcotte and Martineau. Revue de Métallurgie, vol. 24, no. 1 and 2, Jan. and Feb. 1927, pp. 10–19 and 68–78, 16 figs. Details of process, invented by C. F. Sandberg, and employed in France at Hagondange works; principles of process and details of installation; shows that two processes, very different from each other, can be satisfactorily applied to prolong life of rails: (1) sorbitic process, as applied at Hangondange, which gives rail a sorbitic texture; and (2) process in situ, applied to street-car rails on track, which gives superficial martensite layer which greatly increases life of rail.

Shop Equipment. Equipping Shop To Heat Economically, E. F. Davis. Iron Trade Rev., vol. 80, no. 17, Apr. 28, 1927, pp. 1073–1076 and 1081, 5 figs. Essentials of up-to-date heat-treating department from metallurgical viewpoint; pearlite is most important constituent in steel and has an important effect upon machinability; hardness of metal has nothing whatever to do with machining conditions; gears, from which specimens were taken, were annealed in stationary furnaces and investigation revealed impossibility of producing uniform annealing in batch furnaces.

STEEL, HIGH-SPEED

Manufacture. High Speed Steels, F. C. A. H. Lantsberry. Am. Soc. Steel Treating—Trans., vol. 11, no. 5, May 1927, pp. 711–725 and (discussion) 725–729 and 803, 4 figs. Technique of various methods of producing high-speed steels in England, America and Germany, with special reference to methods used in Sheffield, England, in making, composition, working, hardening, tempering and theory of high-speed steels; writer is of opinion that modern tendency is to produce high-speed steels in electric furnace where refining operations make possible use of inferior raw materials and results in greater mass production, but that crucible process is favored in his works in Sheffield because of inherent quality of steel which results in more uniform product in small quantities; comparative analyses of English, American and German high-speed steels; in England high-speed steels are classified according to their tungsten content; in Germany tendency is to increase chromium content.

STEEL WORKS

Accident Prevention. Accident Prevention in Iron and Steel Works (Die Unfallverhütung beim Eisen- und Stahlwerk Hoesch), H. Bitter. Stahl u. Eisen, vol. 47, no. 14, Apr. 7, 1927, pp. 569–576, 13 figs. American methods; new organization in German works; psychic effect, accident pictures and posters; statistics, lectures and rules; mechanical protective devices, gas protection; maintenance and improvements; first aid; advantages of accident protection for employers and employees.

STREET RAILWAYS

Car-Steering Device. Developments in Tramcar Design. Tramway & Ry. World, vol. 61, no. 19, Apr. 14, 1927, pp. 189–191, 7 figs. Jonkhoff automatic steering device is based on principle of making use of difference in direction which occurs, when negotiating curves, between axis of body of vehicle and axis of pivoting trucks.

Car Trucks. Car Trucks with Automotive Drive. Elec. Traction, vol. 23, no. 4, Apr. 1927, pp. 197–198, 2 figs. Two electric-railway companies design worm-drive street-car trucks to reduce unsprung weight, increase speed, eliminate noise and promote riding comfort.

STRESSES

Vibration. Dangers of Vibratory Stresses to Materials (Die Gefahren der Schwingungsbeanspruchung für den Werkstoff), Kühnel. V.D.I. Zeit., vol. 71, no. 17, Apr. 1927, pp. 557–561, 22 figs. Gives numerous examples from German Railway Experimental Bureau showing danger of vibration stress to material, when additional effects in any nature occur; from appearance of fracture it is possible to certain extent to determine origin of fracture.

T

TAPS

Screw Threads. Standards Committee Division Reports. Soc. Automotive Engrs.—Jl., vol. 20, no. 5, May 1927, pp. 559–564. Machine screw taps, cut and ground threads; hand plug taps, cut and ground threads; tapper taps, ground and cut threads.

TERMINALS, LOCOMOTIVE

Albany, Ga. Central of Georgia Builds New Engine Terminal, S. A. Elkan. Ry. Age, vol. 82, no. 21, Apr. 23, 1927, pp. 1245–1247, 4 figs. Modern facilities are provided at Albany, Ga., to meet demands of increased traffic and to effect economies.

Canadian National Railway. Toronto Locomotive and Car Facilities, Canadian National Railway. Can. Ry. & Mar. World, no. 350, Apr. 1927, pp. 179 and 186–190, 8 figs. Locomotive facilities consist of locomotive house, with fan house and arch brick and casting store annexes, machine shop, stores building, ash-handling plant, water tank and three standpipes, wheel shop, coaling plant and sand facilities and bunkhouse; car facilities consist of commissary and car-departments building, passenger-car shop, ice house, storm sash building, garage and first-aid room, electric substation, freight-car repair building and storage and mill building.

Turntables. Turning Gear for Locomotives Employed on P.-L.-M. Line (Appareils de tournage pour locomotives à grand empatement employés sur le réseau P.-L.-M.), M. Hubert. Revue Générale des Chemins de Fer, vol. 46, no. 4, Apr. 1927, pp. 309–328, 17 figs. Equipment employed can be classified in two groups: turntables driven by steam engine or by electric motor, with diameter of 20 to 21 in.; and turn bridges which are manually operated by 2 men; these are 23 in. in length.

TEXTILE MACHINERY

Weaving Machines. Progress in Weaving Machinery (Fortschritte der Webereimaschinentechnik), J. Walther. V.D.I. Zeit., vol. 71, no. 10, Mar. 5, 1927, pp. 324–326, 13 figs. Increasing output by weaving machines and auxiliary equipment; use of Nicolet looms; automatic stopping of loom by warp stop motion in event of warp breaking; possibilities of producing patterns in woven goods in direction of weft by using Otto's shuttle-change device; novel weft picker with weft inserting hooks as provided on Gabler loom. See also translation in Eng. Progress, vol. 8, no. 4, Apr. 1927, pp. 91–92, 10 figs.

TEXTILE MILLS

Tandem Drive Control. Tandem Drive-Control in a Textile Plant, R. T. Kintzing. Elec. World, vol. 89, no. 18, Apr. 30, 1927, pp. 915–916, 3 figs. Tandem or train drive for process involving continuous printing of patterns on rugs, setting dyes and drying material.

TIME STUDY

Morale as Factor In. Morale as a Factor in Time Study Technique, M. L. Cooke. Taylor Soc.—Bul., vol. 7, no. 2, Apr. 1927, pp. 331–337 and (discussion) 331–343. As illustrated by a recent investigation of production standards used in garment industry in Cleveland.

Work-Recording Clocks. Production Control, Especially Time Studies, by Means of the Poppelreuter Work-Recording Clock (Betriebsbeobachtungen, insbesondere Zeitstudien mittels der Poppelreuterschen Arbeitsschauuhr), E. Bramesfeld. Maschinenbau, vol. 6, no. 3, Feb. 3, 1927, pp. 109–113, 15 figs. This clock can be used to clearly and accurately indicate progress of work and time required; gives examples of diagrams obtained.

The Direct Diagrammatic Time Study (Die direkte schaubildliche Zeitstudie), W. Poppelreuter. Maschinenbau, vol. 6, no. 3, Feb. 3, 1927, pp. 113–115, 10 figs. Shows advantage of graphic time-study method over imperfect stop-clock method; time keeper records his observations on registering apparatus, a Poppelreuter work-recording clock, and time rates are plotted as surface diagrams.

TIRES, RUBBER

Pneumatic. Puncture-Sealing Compounds for Pneumatic Tires. U. S. Bur. Standards—Circ., no. 320, Jan. 11, 1927, pp. 1–5. Different methods which are employed to render tires "puncture-proof" or self-sealing against punctures; discussion of type which is most common; arguments for and against use of such puncture-sealing compounds.

TRAFFIC

Signals. Standardization of Traffic Signals Recommended. Elec. Ry. Jl., vol. 69, no. 22, May 28, 1927, pp. 949–944, 2 figs. Joint committee of municipal officials and representatives of lighting industry in New York State suggests general adoption of two-color indications with all turns made on green light.

TUBES

Non-Ferrous Metal. Manufacture of Non-Ferrous Metal Tubes by Hydraulic Extrusion, W. Kurz. Metal Industry (Lond.), vol. 30, no. 13, Apr. 1, 1927, pp. 333–335, 4 figs. Methods and appliances applied in processes in Continental Europe; extruding other metals; sizes of billets for extrusion; steel tools for extrusion presses.

V

VAPORS

Pressure. Equation of Vapor Pressure at Low Temperatures (Ueber die Dampfspannungsgleichung bei tiefen Temperaturen), V. Fischer. Zeit. für Physik, vol. 39, no. 10–11, Nov. 16, 1926, pp. 879–882. In previous paper author deduced equation of vapor pressure on assumption that change of volume of liquid or solid state in domain considered could be neglected; in present paper he deduces equation without this assumption.

W

WATER HAMMER

Theories. Comparison and Limitations of Various Water Hammer Theories, R. S. Quick. Mech. Eng., vol. 49, no. 5a, Mid-May 1927, pp. 524–530, 13 figs. Confirmation of accuracy of elastic-water-column theory by experimental test data; charts graphically solving problems of maximum pressure rise with uniform gate motion and complete closure.

WATER POWER

Canada. Development of Water Power In Canada. Can. Engr., vol. 52, no. 17, Apr. 26, 1927, pp. 469–472. Review of water-power resources in Dominion prepared by Dominion Water Power and Reclamation Service of Department of Interior; large water powers available for industry awaiting development.

WATER TREATMENT

Railway Plants. Cutting the Cost of Water Treatment \$2.27 per 100,000 Gal., C. R. Knowles. Ry. Eng. & Maintenance, vol. 23, no. 5, May 1927, pp. 209–210, 4 figs. Illinois Central reduces expense at new plant by recovering filter wash water and curbing loss in sludging.

WELDING

Electric. See ELECTRIC WELDING, ARC.

Heating Systems. Welding in Plumbing and Heating, S. E. Dibble. Welding Engr., vol. 12, no. 4, Apr. 1927, pp. 42–44, 11 figs. Experimental installation shows advantages of welding torch in assembling low-pressure heating systems.

Oxyacetylene. See OXYACETYLENE WELDING.

Steel Pipe. Welded Pipe for Water System, W. P. Brown. Welding Engr., vol. 12, no. 4, Apr. 1927, pp. 27–29, 5 figs. All field joints were acetylene welded, tank gas being used; in very deep cuts pipe was welded on high horses, lowered to 40-in. level and tied into line and then whole line lowered to bottom of ditch; saving of time and money by using welding process.

Thermit. Mill Parts are Reclaimed by New Welding Process. Iron Trade Rev., vol. 80, no. 18, May 5, 1927, pp. 1139–1140. New improved method of making thermit weld is important economic factor in reclamation work.

X-Ray Application to. Application of X-Rays to Welding Practice (Anwendung der Röntgenstrahlen in der Schweisstechnik), C. Kaniner and A. Herr. V.D.I. Zeit., vol. 71, no. 17, Apr. 23, 1927, pp. 571–576, 45 figs. Investigations of materials and welds; discussion of X-ray equipment; evaluation of results.

WELDS

Tests. Tests of Welds at Lehigh University. Eng. News-Rec., vol. 98, no. 15, Apr. 14, 1927, p. 619. Number of tests of welded joints and members were made at Lehigh University; planned to throw light on physical characteristics of joints made by several processes; they included tension tests of welded bars, test of square frame of I-beams and H-columns, and test of trussed joist.

WIND TUNNELS

Closed Type. Wall Interference in Closed Type Wind Tunnels, G. J. Higgins. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 256, Mar. 1927, pp. 1–6, 10 figs. Tests conducted in variable-density wind tunnel on several airfoils of different sizes and sections to determine effect of tunnel-wall interference and to determine correction which can be applied to reduce error caused thereby; use of several empirical corrections was attempted with little success; Prandtl theoretical correction gives best results and its use is recommended for correcting closed-wind-tunnel results to conditions of free air.

WIRE ROPE

Bending Capacity. The Bending Capacity of Wire Rope (Uber die Biegefähigkeit von Seildrähten), H. Sieglerschmidt. V.D.I. Zeit., vol. 71, no. 16, Apr. 16, 1927, pp. 517–520, 9 figs. Results of tests at Materials Testing Station at Berlin-Dablem, carried out on plain and on galvanized wires; difference in bending capacity of uncoated and galvanized wires could not be found.

WOOL

Dyeing. Theories of Dyeing Wool, A. P. Sachs. Nat. Assn. Wool Mfrs.—Bul., vol. 57, no. 2, Apr. 1927, pp. 243–251. It is shown that dye solutions are colloidal in nature; wool is amorphous colloid and amphoteric protein; reaction between wool and dyestuff is probably similar in general nature to, but greatly different in detail from reactions between other textile fibers and dyestuffs; process of dyeing wool is strictly colloid-chemical phenomenon.

Z

ZINC ALLOYS

Zinc-Aluminum. Change of Zinc-Aluminum Alloys in Solid State (Umwandlung von Zink-Aluminiumlegierungen im festen Zustand), W. Fraenkel and J. Spanner. Zeit. für Metallkunde, vol. 19, no. 2, Feb. 1927, pp. 58–60, 2 figs. Influence of small additions of other metals on velocity and transformation; results of tests.

THE ENGINEERING INDEX

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Mechanical Engineering Section

THE ENGINEERING INDEX presents each month, in conveniently classified form, items descriptive of the articles appearing in the current issues of the world's engineering and scientific press of particular interest to mechanical engineers. At the end of the year the monthly instalments are combined along with items dealing with civil, electrical, mining and other branches of engineering, and published in book form, this annual volume having regularly appeared since 1906. In the preparation of the Index by the engineering staff of The American Society of Mechanical Engineers some 1200 technical publications received by the Engineering Societies Library (New York) are regularly reviewed, thus bringing the great resources of that library to the entire engineering profession.

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ABRASIVES

Automobile Plants. Abrasive Engineering Practice in Automobile Manufacturing Plants, F. B. Jacobs. Abrasive Industry, vol. 8, no. 6, June 1927, pp. 182–184. Presents list of grinding-wheel manufacturers' trade names; fully 95 per cent of all abrasives used in automobile factories fall under two heads; carbide of silicon and manufactured alumina.

AERONAUTICS

Problems. Aeronautics, A. Guidoni. Roy. Aeronautical Soc.—Jl., vol. 31, no. 197, May 1927, pp. 420–444. Presents chief problems which arise in aeronautical field, so as to form idea for their solution; problems of aircraft design; law of power and weight; accidents; improvements to be effected; personnel and material; air-force organization.

AIR COMPRESSORS

Explosion Prevention. Installation and Operation of Air Compressor Plants for Avoidance of Explosions, W. Greenwood. Iron & Steel Engr., vol. 4, no. 5, May 1927, pp. 229–232. Describes conditions that are responsible for explosions within air receivers and piping; presents code of rules for safe installation and operation of air-compressor plants, rules in most instances being accompanied by notes containing suggestions or explanatory matter.

AIRCRAFT

Bolling Field Display. The Aircraft Display at Bolling Field. Aviation, vol. 22, nos. 21 and 22, May 23 and 30, 1927, pp. 1088–1089 and 1177–1179. Aircraft-engine and equipment manufacturers; list of aircraft-accessory manufacturers who exhibited.

Speed Calculation. New Formula for Speed Calculations. Flight, vol. 19, no. 22, June 2, 1927, p. 353. Formula which is to be used for calculating speed of machines for purposes of handicapping in King's Cup Race; it does not take either wing loading or power loading into consideration, but merely wing span in relation to power, or what may be termed, for want of better term, "span power."

AIRPLANE ENGINES

Cam Type. Cam Engine Passes Fifty Hour Test. Aviation, vol. 23, no. 1, July 4, 1927, pp. 20–21, 3 figs. Fairchild Caminez Engine Corp. development announced as approved type by Department of Commerce and is placed in production; cam design permits operation of engine with same piston speed as conventional crank engine, while propeller is rotating at one-half of the usual speed; hence, this speed of 900 r.p.m. is equivalent to 1800 r.p.m. for crank type of engine.

Causan. A Combustion Engine of the Future (Un moteur à explosion de l'avenir), A. Berreur. Aérophile, vol. 35, no. 1–2, Jan. 1–15, 1927, pp. 11–16, 2 figs. Details of newly designed 700-hp. engine having two blocs of 4 cylinders each, and two pistons per cylinder; weight, 320 kg.; speed, 2400 r.p.m.; claimed to run without vibration.

Dynamic Forces. Dynamic Forces in Aircraft Engines, B. C. Carter. Roy. Aeronautical Soc.—Jl., vol. 31, no. 196, Apr. 1927, pp. 278–309 and (discussion) 309–328, 18 figs. Natural torsional vibration; application to single-throw radial engine; calculation of main synchronous speed; effects of driving damper or supercharger from tail end of crankshaft; effects of big-end clearances in single-throw radial engines; torsional vibration in multi-crank engines; frequency equations for various airscrew-crankshaft systems.

Radiators. Resistance and Cooling Power of Various Radiators, R. H. Smith. Nat. Advisory Committee for Aeronautics—Report, no. 261, 1927, 16 pp., 16 figs. Report combines wind-tunnel results of radiator tests made at Navy Aerodynamic Laboratory in Washington during summers of 1921, 1925 and 1926; 13 radiators of various types and capacities were given complete tests for figure merit; twelve of these were tested for resistance to water flow and fourteenth radiator was tested for air resistance alone, its heat-dissipating capacity being known.

United States Navy. Recent Development in Aircraft Power Plants, C. C. Champion, Jr. Soc. Automotive Engrs.—Jl., vol. 20, no. 5, May 1927, pp. 647–660, 11 figs. Two accepted arrangements of aircraft engines for naval use at present are radial and in-line, and cooling is by air or by water; analysis of troubles experienced with water-cooled engines shows that large proportion are due to failures of some part of water system; air cooling eliminates troubles and additional weight due to water cooling; in matter of mechanical dependability, there seems to be little choice between engines proper of two types; from viewpoint of fuel economy, the two are equally good; types of engine being produced for Navy; discusses superchargers, starters, ignition, fire hazard of airplanes, gearing of airplane engines, heavy-oil solid-injection compression ignition engines for aircraft use, and steam power plants for same purpose.

Whirlwind. Fuel and Oil Consumption Important Factors on Long Distance Flights, R. V. Cautley. Aviation, vol. 22, no. 23, June 6, 1927, pp. 1214–1215. Good results obtained by Charles A. Lindbergh with Whirlwind air-cooled engine on cross-Continent and Trans-Atlantic trips.

Wright Whirlwinds Have Played Important Parts in Making Aeronautical History. Aviation, vol. 22, no. 26, June 27, 1927, pp. 1432–1433, 3 figs. They have proved merit at national and local air races and reliability tours as well as on famous North Pole and Transatlantic flights.

AIRPLANE PROPELLERS

Design. Some Notes on the Design of Airscrews, F. S. Barnwell. Instn. Aeronautical Engrs.—Jl., vol. 1, no. 5, May 1927, pp. 56–77 and (discussion) 77–83, 6 figs. Deals with simple blade-element theory; means for determining effect of body on tractor air propeller and effect of air propeller on body; metal propellers.

Geared-Down. Geared Down Propellers and Efficiency of Commercial Airplanes, R. M. Mock. Aviation, vol. 22, no. 22, May 30, 1927, pp. 1137–1140. Better performance attained in spite of increased weight.

Metal. Metal Propeller Development, E. G. McCauley. Aviation, vol. 22, no. 22, May 30, 1927, pp. 1127–1130 and 1144, 10 figs. Extensive test work responsible for present efficiency of metal propellers for aircraft use; detachable blade; composition of aluminum alloy.

Sections. Characteristics of Propeller Sections Tested in the Variable Density Wind Tunnel, E. N. Jacobs. Nat. Advisory Committee for Aeronautics—Report, no. 259, 1927, 16 pp., 18 figs. Results obtained, besides providing data for design of propellers, should be of special interest because of opportunity afforded for study of scale effect on family of airfoil sections having different thickness ratios.

AIRPLANES

Airfoils. Determining the Velocity Distribution in the Boundary Layer of an Airfoil Fitted with A Rotary Cylinder, B. G. Van der Hegge Zijnen. Nat. Advisory Committee for Aeronautics—Tech. Memorandum, no. 411, May 1927, pp. 1–15, 9 figs. In closer investigation of results obtained from wing model with rotary cylinder mounted in its leading edge, velocity distribution in vicinity of surface of model was determined by means of hot-wire anemometer; results confirmed belief that rotary cylinder had considerable effect on air flow, but demonstrated fact that direct influence of cylinder is confined to very thin layer in immediate proximity to surface. Translated from Ingenieur, Oct. 23, 1926.

The Effect of a Flap and Ailerons on the N.A.C.A.—M6 Airfoil Section, G. J. Higgins and E. N. Jacobs. Nat. Advisory Committee for Aeronautics—Report, no. 260, 1927, 18 pp., 24 figs. Results obtained at Langley Memorial Aeronautical Laboratory on airfoil, fitted with flap and ailerons, and tested in variable-density wind tunnel at density of 20 atmospheres; comparison of calculated angles of zero lift and calculated lift and moment coefficients with those observed.

American. The Aircraft Industry at Bolling Field. Aviation, vol. 22, no. 20, May 16, 1927, pp. 1033–1038, 7 figs. 65 aircraft manufacturers exhibit at all-American aircraft display; review of exhibits indicates progressive state of industry; aircraft manufacturers.

American Eagle. The American Eagle Commercial Plane. Aviation, vol. 22, no. 23, June 6, 1927, p. 1240, 2 figs. Outstanding design that involves several individual and distinct features which reduce maintenance; direct steel-tubing aileron control is positive, control wires, pulleys and accompanying friction being wholly eliminated; tail skid can be removed to re-wrap shock cord by removing two bolts which are easily accessible.

Bach. The Bach C-S-1 Cabin Plane. Aviation, vol. 22, no. 22, May 30, 1927, p. 1135. Three-passenger enclosed-cabin machine designed for private owner; simplicity and ruggedness are features; powered by 120-hp. super Rhone radial air-cooled engine.

Bellanca. The History of the Columbia. Aviation, vol. 22, no. 26, June 27, 1927, pp. 1430–1431, 2 figs. Facts and figures on construction, performance and records of the New York-to-Germany plane.

Bonney Seagull. Bird-Like Design Features Bonney "Seagull." Aviation, vol. 22, no. 24, June 13, 1927, pp. 1290–1291, 3 figs. By reproducing same aerodynamic characteristics as those of gull, L. W. Bonney expects to give his plane similar performance; independent movement of wing sections; entire wing of duralumin; dual side-by-side control.

Canadian Industry. The Canadian Aircraft Industry. Aeroplane, vol. 32, no. 19, May 11, 1927, pp. 534, 543–544, 546 and 548, 5 figs. Types of planes developed in Canada.

Chance Vought. Chance Vought Products Maintain High Standard of Quality and Performance. Aviation, vol. 22, no. 24, June 13, 1927, pp. 1278–1279. From original VE-7 model to new "Corsair" which holds four world's records, soundness of design has been governing factor; Corsair is designed around

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NOTE.—The abbreviations used in indexing are as follows:

Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

Pratt & Whitney "Wasp" air-cooled engine of 425 hp.

Design. Some notes on the Design of Commercial Aircraft from the Operational Point of View, R. H. Mayo. Roy. Aeronautical Soc.—Jl., vol. 31, no. 197, May 1927, pp. 359–373 and (discussion) 374–392. Deals with regular air transport and general air service, a term which is meant to include all numerous and various applications of aircraft to commercial work other than transport on regular routes to scheduled services; single-engine and multi-engine aircraft; progress in reliability of power plant; controllability; structural strength and detail design; fire prevention; air survey and exploration; taxi-flying.

Elias. Elias Company Builds New Commercial Plane. Aviation, vol. 22, no. 23, June 6, 1927, pp. 1222–1223, 2 figs. Approved by Department of Commerce and powered with 400-hp. Liberty 12-A engine.

Fokker. The Fokker Monoplane. Aviation, vol. 22, no. 21, May 23, 1927, pp. 1082–1083. Details of three-engined monoplane formally accepted by America Trans-Oceanic Co. backing Commander Byrd in his Trans-Atlantic flight attempts; three Wright Whirlwind J-5 engines are installed, rated at 220 hp. at 1800 r.p.m.

German. Development of German Commercial Aircraft (Die Entwicklung des deutschen Verkehrsflugzeuges), W. Huth. V.D.I. Zeit., vol. 71, no. 19, May 7, 1927, pp. 629–635. Attitude of different manufacturers in respect to design and materials; requirements of traffic plane with regard to safety and economic relation between design, material and requirements; monoplane vs. biplane, wood vs. metal; engines; long-distance and giant aircraft.

German Passenger Airplanes (Deutsche Verkehrsflugzeuge), E. Gossow. V.D.I. Zeit., vol. 71, no. 19, May 7, 1927, pp. 617–628, 48 figs. Reviews development of German airplane traffic, and describes machines of Albatros, Focke-Wulf, Fokker-Grulich, Udet and Luftfahrzeug-Gesellschaft m. b. H., Dornier, Junkers and Rohrbach.

Ground Effect. A Full-Scale Investigation of Ground Effect, E. G. Reid. Nat. Advisory Committee for Aeronautics—Report, no. 265, 1927, pp. 3–7, 4 figs. Describes flight tests made with Vought VE-7 airplane to determine effects of flying close to ground; it is found that drag of airplane is materially reduced upon approaching ground and that reduction may be satisfactorily calculated according to theoretical formulas.

Hercules. The D.H.66 "Hercules" Aeroplane. Automobile Engr., vol. 17, no. 228, May 1927, pp. 158–164, 11 figs. 14-passenger machine fitted with three Bristol "Jupiter" engines; designed for Imperial airways to operate in near and far East, commencing on Cairo-Karachi route.

Junkers. Junkers Builds New Passenger Monoplane. Aviation, vol. 22, no. 24, June 13, 1927, pp. 1284–1285, 3 figs. Has three engines, 700-mi. cruising radius and luxurious passenger accommodations for 15 people.

The Junkers Giant Plane G 31 (Das Junkers-Verkehrsgrossflugzeug G 31). V.D.I. Zeit., vol. 71, no. 19, May 7, 1927, pp. 648–650, 8 figs. Details of three-engined passenger plane which is development of model G 24; it is all-metal construction, mainly of duralumin.

Metal. Metal Aircraft, R. G. Miller. Tech. Eng. News, vol. 8, no. 3, Apr. 1927, p. 117. Advantages and disadvantages in using light aluminum alloys instead of fabrics for coverings.

Paris Show. Airplane Exhibit at the Tenth Paris Aviation Show (Flugzeuge der zehnten Pariser Luftfahrt-Ausstellung), F. Gosslau. V.D.I. Zeit., vol. 71, no. 19, May 7, 1927, pp. 637–644, 48 figs. Tendencies of design; among exhibits is Amiot 150, which is first large French commercial plane of metal construction with wings without external bracing; planes with giant cabins; new military planes; special aircraft designed to operate with mother ship; multi-purpose aircraft; new method in static structure.

Rotating Cylinders. Tests with Rotating Cylinders in Combination with Wings (Versuche mit rotierenden Zylindern in Verbindung mit Tragflächen), K. Frey. Zeit. für technische Physik, vol. 8, no. 1, 1927, pp. 8–12, 7 figs. Review of literature; discussion of new type of model developed as result of wind-tunnel investigations at Hannover Technical Academy; test results on this model.

Ryan. Mechanical Features of the Trans-Atlantic Plane. Am. Mach., vol. 66, no. 22, June 2, 1927, pp. 929–932. Features of engine, instruments and plane.

The Ryan Monoplane. Aviation, vol. 22, no. 21, May 23, 1927, pp. 1083–1084. Revised Ryan M-I monoplane, has for its outstanding feature fact that pilot is placed in about center of fuselage with no direct forward visibility other than that afforded by small periscope which can be projected out side; at each side of pilot are two windows which can be opened and which afford certain amount of forward visibility for landing purposes; there is door on right side, which contains removable window; plane was built in 60 days and has been named "Spirit of St. Louis;" equipped with Wright Whirlwind engine.

Slotted Wings. Airplanes with Slotted Wings (Spaltflügel-Flugzeuge), E. Everling. V.D.I. Zeit., vol. 71, no. 19, May 7, 1927, pp. 645–647, 14 figs. Purpose of slotted wings according to Lachmann and Handley Page is to increase lift and to decrease landing speed; investigation of flow conditions; different types of slotted wings.

Spinning. Spinning Tests on Observation Planes —McCook Field. Aviation, vol. 22, no. 22, May 30, 1927, pp. 1133–1134. Results of flight tests to date appear to show conclusively that mass distribution is controlling characteristic; large lateral moments of inertia, such as exist with tanks in wings, or with wings of large span, make recovery difficult if center of gravity is too far to rear; with smaller lateral moments, center of gravity may be placed farther to rear before recovery becomes difficult.

Wings. Experimental Verifications of the Theory of Supporting Wings (Vérifications expérimentales de la théorie des ailes sustentatrices), A. Toussaint and E. Carafoli. Aérophile, vol. 35, nos. 7–8 and 9–10, Apr. 1–15 and May 1–15, 1927, pp. 106–109 and 147–152, 22 figs. Calculations of induced angle in median section; application to comparison of experimental and theoretical pressure in median section of wings having same profile (von Mises) and different spans.

AIRSHIPS

Development and Future. The Development and Future of the Airship, E. E. H. Evans. Instn. Aeronautical Engrs.—Jl., vol. 1, no. 5, May 1927, pp. 50–53. It is along developed lines of Zeppelin's rigid type of construction that modern airship design and construction is being carried out, as it is considered in present stage of development, that non-rigid type has limitations from commercial point of view, large gas capacity being requisite to ensure high useful load for long-range operations; points out great possibility of airship for commercial purposes.

AMMONIA CONDENSERS

Shell-and-Tube. Modern Shell and Tube Ammonia Condensers, W. H. Motz. Power, vol. 65, no. 23, June 7, 1927, pp. 882–884, 7 figs. Construction and operation of latest types used in refrigerating plants; single-pass multi-tube type; features of construction; operating characteristics.

APPRENTICES, TRAINING OF

Foundry. Five Industrial Cities Combine Forces to Train Apprentices, S. M. Brah. Foundry, vol. 55, no. 10, May 15, 1927, pp. 380–384 and 390, 8 figs. Interesting work in apprentice training is being carried on in five communities located in two states, but so grouped as to form logical training unit; farm implements and accessories predominate in list of articles manufactured.

Upgrading of Foundry Apprentices, C. H. Ross. Am. Foundrymen's Assn.—advance paper, no. 4, for mtg. June 6–10, 1927, 6 pp. Method used in upgrading various classes of molder apprentices of Union Malleable Iron Co.; method used is called earn-and-learn method; apprentices are grouped in three classes.

AUTOMOBILE ENGINES

Crankcase-Oil Recovery. Crankcase Oil Reclaiming System Developed by Sharples. Automotive Industries, vol. 56, no. 21, May 28, 1927, pp. 804–805, 2 figs. Drainings are charged into treating tank, clarifying solution added and mixture agitated by pump; separated in centrifuge after passing through heater coils; three systems of heating.

Heavy-Oil. High-Speed Oil Engines for Vehicles, L. Hausfelder. Nat. Advisory Committee for Aeronautics—Tech. Memorandums, no. 410, May 1927, pp. 1–32, 53 figs. Author predicts that two-stroke cycle will determine future of small Diesel engine for vehicles; it offers considerably less difficulties than in large engines, where high temperatures, which increase rapidly with revolution speeds, greatly impair lubrication and durability of materials; way is indicated for offsetting to some extent weight increase of Diesel engine, necessitated by higher working pressures, by doubling effective working strokes, so that at most, it will not be heavier than carburetor engine. Translated from Motorwagen, Dec. 20, 31, 1926 and Jan. 10, 1927.

Minerva-Bournonville. The Minerva-Bournonville Engine. Automobile Engr., vol. 17, no. 228, May 1927, pp. 184–186, 4 figs. Interesting rotary-valve scheme embodying novel features; design evolved by Minerva Co. of Antwerp is invention of Belgian engineer, M. Bournonville.

Six-Cylinder Induction. Induction Currents, L. Manteli. Automobile Engr., vol. 17, no. 228, May 1927, pp. 178–179, 5 figs. Analysis of 6-cylinder engine system.

AUTOMOBILE INDUSTRY

Italy. The Italian Automobile Industry During 1926, P. R. Mattix. Commerce Reports, no. 22, May 30, 1927, pp. 526–528, 2 figs. Mass production and long-term credits adopted; local demand overestimated; small car as an export-market winner; principal markets in 1924, 1925, and 1926.

AUTOMOBILE LICENSE PLATES

Manufacture. Making Automobile License Plates, R. T. Kent. Iron Age, vol. 119, no. 23, June 9, 1927, pp. 1653–1657, 6 figs. There are two distinct methods followed in manufacture of license plates; difference lies in manner of embossing plates, and in method of application of base color; older method of embossing consists in use of steel male die, female being heavy rubber pad, as contrasted with more modern method of using all-steel die; despite this seemingly simple difference, substitution of all-steel die changes whole process and effects many economies in subsequent operations; in application of color, two processes in general use are spray booth, with separate baking ovens, and dip process, with continuous oven for baking, forming integral part of operation.

AUTOMOTIVE FUELS

Aircraft. Safe Aircraft Fuels (Les Carburants de Sureté pour Avions), A. Grebel. Génie Civil, vol. 90, nos. 14, 15 and 16, Apr. 2, 9 and 16, 1927, pp. 331–337, 361–364 and 380–382, 4 figs. Gives specifications for airplane fuel for French army; compares French specifications with those of other countries; characteristics of different commercial oil fuels; advantage and disadvantage of fuels of low volatility and of heavy oil fuel; comparison of analyses of principal fuels used in internal-combustion engines; point of inflammability; safety fuel or "white spirit."

Charcoal Suction Gas. Suction Gas for Commercial Vehicles. Engineer, vol. 143, nos. 3721 and 3722, May 6 and May 13, 1927, pp. 488–490 and 516–517, 5 figs. Discusses methods and apparatus for making charcoal continuously or for recuperating by-products in entirely enclosed receptacles; disadvantages in use of suction gas for motor vehicles; eleven firms ran suction-gas vehicles from Blois where exhibition was held, to Forest of Menars, where demonstration of carbonizing apparatus was in progress.

AVIATION

Airport Lighting. Night Flying Equipment for the Airdrome, W. T. Harding. Aviation, vol. 22, nos. 21 and 22, May 23 and 30, 1927, pp. 1079–1081 and 1141–1144, 7 figs. May 23: Authoritative discussion of present status in development of airport lighting. May 30: Landing-field floodlights; various methods of floodlighting, comparing merits.

Beacons. Long-Range Beacon (Les Phares à Très Longue Portée), C. Dantin. Génie Civil, vol. 90, no. 14, Apr. 2, 1927, pp. 329–331, 5 figs. Details of aviation beacon on Mount Valérien, near Paris; consists of two projectors mounted on a revolving platform, operated by electric motor; each projector is provided with two reflectors.

Celestial Space. The Possibility of Flight into Celestial Space (Die Möglichkeit der Weltraumfahrt), H. Lorenz. V.D.I. Zeit., vol. 71, no. 19, May 7, 1927, pp. 651–654, 2 figs. Examines possibility of rocket flight into space with aid of terrestrial propulsion media; calculation of conditions of initial to final rocket mass from available energy sources; author seeks to demonstrate impossibility of rocket flight in present state of knowledge.

Italy. Italian Civil Aviation. Engineering, vol. 123, no. 3199, May 6, 1927, pp. 540–542, 2 figs. Italy has four well-established airways employing 26 machines and 33 pilots and, both from strategic and economic points of view, lines are admirably calculated to serve Italian interests.

Locating Aircraft at Night. A Suggestion for a New Method of Locating Aircraft at Night, W. Sackville and J. E. Olivares. Coast Artillery Jl., vol. 66, no. 5, May 1927, pp. 411–417. Requirements of instrument for detecting and locating aircraft at night; possible methods; instruments which may be used for detecting heat rays; problem of range.

New York—Paris Flight. New York—Paris Flight a Reality. Aviation, vol. 22, no. 22, May 30, 1927, pp. 1120–1122. Lindbergh makes first successful non-stop flight; log of flight.

Signaling. Aviation Signaling and Safety, W. V. Gilbert. Aviation, vol. 22, no. 22, May 30, 1927, pp. 1170–1172, 1 fig. Value of pyrotechnic signal systems in aircraft operation particularly in airport control work.

Testing Aviator's Aptitude. Man and the Machine, M. Flack. Roy. Aeronautical Soc.—Jl., vol. 31, no. 197, May 1927, pp. 393–404 and (discussion) 405–410. Study of man in relation to his machine; points out that all men are not endowed with ability to make coördinated movements of arm and leg necessary adequately to control machine; study of psychomotor responses or reflexes in relation to flying; describes apparatus devised by G. H. Reid which has been put to test both in laboratory and flying training station for (1) testing potential aptitude for controlling control column by delicate coördinated movements of arm, (2) testing aptitude for working rudder bar in similar fashion and (3) testing aptitude to perform combined movements of arm and leg necessary for various movements of flying.

Traffic Regulation. The Regulation of Air Traffic, C. Turner. Roy. Aeronautical Soc.—Jl., vol. 31, no. 197, May 1927, pp. 411–419, 2 figs. Shows that not only is third dimension far from causing additional dangers, but that if properly considered in framing of rules, it allows most of possible causes of collision to be eliminated.

Weather Forecasting. The Flier's Aspects of Aerography Forecasting, A. McAdie. Aviation, vol. 22, no. 20, May 16, 1927, pp. 1043–1045, 3 figs. Various instruments and methods used by pilots and their relative values in weather forecasting.

World Records. The Recent Air Records, E. E. Wilson. Aviation, vol. 22, no. 22, May 30, 1927, pp. 1131–1132. Value and importance of air-cooled engine development is reflected in record performances.

Recent American and World Air Records. Aviation, vol. 22, no. 22, May 30, 1927, p. 1123. Tabular data.

B

BEARINGS

Anti-Friction. Anti-Friction Bearings for Railway Rolling-Stock. Ry. Engr., vol. 48, no. 569, June 1927, pp. 228–231, 5 figs. Experience in Europe has demonstrated considerable advantages; refers to very favorable results obtained in Denmark, France, Germany, and also in United States; tests on roller-bearing boxes on Vaster-Götland Gothenburg Railway.

Axle. Housing for Wedge-Type Bearing Adapted for Axles. Elec. Ry. Jl., vol. 69, no. 21, May 21, 1927, pp. 894–896, 4 figs. Wedge-type axle bearings used by Third Avenue Railway, New York City, make accurate fits easy to obtain and, due to tight fit of bearings in their housings, wear, with its resulting noise and trouble, is reduced.

Lubrication. The Lubrication of Waste-Packed Bearings, G. B. Karelitz. Mech. Eng., vol. 49, no. 6,

June 1927, pp. 663–670, 17 figs. Based on results of investigation made by Westinghouse Electric and Manufacturing Co., author discusses feeding of oil through waste and existence of load-carrying oil film in waste-packed bearings as essential for their proper performance; observations on friction and temperatures of these bearings and on importance of proper packing to insure sealing window by oil-saturated waste, and also discusses existence of critical oil lift at which seal is broken; reason for occasional end wear and scoring of ends of shell during running-in period of service.

Mechanical Lubrication. The Economic Advantages of Mechanical Bearing Lubrication for Railway Practice (Die wirtschaftlichen Vorteile der mechanischen Lagerschmierung für den Eisenbahnbetrieb), W. Friedrich. Organ für die Fortschritte des Eisenbahnwesens, vol. 82, no. 7, Apr. 15, 1927, pp. 125–126, 3 figs. Results of tests show advantages of system of mechanical lubrication for car-journal bearings described in same Journal in 1924 by F. Dutting.

BEARINGS, BALL

Transmission. Experimental Study of Transmission Bearings (Etude Experimentale des Paliers de Transmission), C. Hanocq. Revue Universelle des Mines, vol. 14, nos. 1 and 3, Apr. 1, 1927, and May 1, 1927, pp. 5–20 and 93–104, 21 figs. Results of experiments carried out at Machine-Construction Laboratory at University of Liège on ball bearings.

BEARINGS, ROLLER

Railway. Advantages of the Roller Bearing and Locomotive Booster. Ry. & Locomotive Eng., vol. 40, no. 5, May 1927, pp. 127–130, 3 figs. Demonstrated in operating suburban passenger trains on C. M. & St. P. Ry.

Timken. Medart Timken-Bearing Transmission Equipment. Machy. (N. Y.), vol. 33, no. 9, May 1927, p. 712, 1 fig. Timken tapered roller bearings are provided in line of spherical ball and socket pillow blocks, ball and socket hanger bearings, unit mountings and loose pulleys being placed on market by Medart Co., St. Louis, Mo., for many industrial applications; features claimed for these appliances are that power and lubricant are saved, alignment preserved, and wear practically eliminated.

BELT DRIVE

Center Distances. Factors in Determining Proper Center Distances for Leather Belt Drives, R. C. Moore. Indus. Engr., vol. 85, no. 5, May 1927, pp. 201–204, 4 figs. Considerations in connection with determining proper distance between pulleys.

BELTS

Creep and Slip. Distribution of Belt Creep and Slip, R. F. Jones. Mech. Eng., vol. 49, no. 7, July 1927, pp. 794–798, 20 figs. Stroboscope slip meter used in tests and method followed by investigators as well as theory involved are explained; results show that arc over which belt creeps starts at last point of contact and extends in direction opposite to rotation an amount depending on load; when arc of creep coincides with arc of contact, true slip begins; greatest slip always occurs at last point of contact.

BENZOL

Distillation. Separation of Benzol and Toluol by Means of Column Distillation (Skiljande av bensol och toluol fran varandra genom kolonndestillation), E. Oeman. Teknisk Tidskrift (Kemi), vol. 57, no. 19, May 14, 1927, pp. 38–41, 3 figs. Calculations of apparatus for distillation of benzol and toluol.

Distillation Curve. Determination of the Distillation Curve for Benzol-Toluol (Bestämning av destillationskurvan för bensol-toluol), E. Oeman. Teknisk Tidskrift (Kemi), vol. 57, no. 19, May 14, 1927, pp. 35–38, 7 figs. Method of analysis of benzol and toluol in mixture worked out by M. Friedman and C. Cederstrom, which permits calculation of distillation curve for these hydrocarbons.

BOILER FEEDWATER

Heating. Selection of Pressures for Stage Feed Heating (Der Anzapfdruck des Regenerativverfahrens im Kraftwerksbau), F. Suabedissen. Wärme, vol. 50, no. 13, Apr. 1, 1927, pp. 229–233, 4 figs. Author explains general advantages of stage heating of feedwater by extracted steam and develops chart which facilitates selection of most favorable extraction pressures in any particular case; general aim is to generate as much electrical energy as possible by back-pressure working; theoretically, continuous extraction offers maximum advantage, but in practice it is rarely economical to extract at more than three stages; shows graphically effect of initial steam pressure and superheat, condenser vacuum, thermodynamic efficiency, and feedwater temperature on most favorable extraction pressure; and demonstrates that only factors of material importance in connection are pressure of steam at turbine inlet, and feedwater temperature at lowest stage of preheater.

Hydrogen-Ion Concentration in. Potentiometric Determination of Hydrogen Ion Concentrations in Boiler Waters, W. N. Greer and H. C. Parker. Am. Water Wks. Assn.—Jl., vol. 17, no. 5, May 1927, pp. 569–582, 7 figs. Alkalinity measurements as means of approximating H-ion concentration; determination of hardness by soap method gives, at best, only approximate value; there is more or less definite relation between alkalinity and pH of natural waters at lower alkalinities; use of hydrogen and quinhydrone and tungsten electrodes.

Treatment. Some Notes on Feed Water Treatment, A. Seton. Eng. & Boiler House Rev., vol. 40, no. 11, May 1927, pp. 569–570. Most of failures which are recorded are directly due to water and its dissolved constituents, including gases and oil in suspension; ideal plan, which is not always practicable is to condense all steam after use, and to use condensate as make-up; under best conditions 90 per cent of steam generated may be recovered in this way; softening of boiler water.

Treating of Water for Boiler Feed Pays Handsome Dividends, F. B. Good. Nat. Petroleum News, vol. 19, no. 21, May 25, 1927, pp. 59–62. Deals with different systems of treatment.

BOILER FURNACES

Air Preheating. The Influence of Preheated Air on Combustion Process (Die Beeinflussung des Verbrennungsvorganges durch vorgewärmte Luft), W. Gumz. Feuerungstechnik, vol. 15, no. 12, Mar. 15, 1927, pp. 133–137, 5 figs. Combustion of solid fuels on grate; carbon combustion; influence of temperature, time and carbon modification; influence of excess oxygen and nitrogen, combustion of volatile constituents and gases; combustion with preheated air and its advantages; combustion in pulverized-coal, oil-fired and gas-fired furnaces and influence of preheating.

Gas Stratification, Effect of. Effects of Furnace Gas Stratification on Overfeed Stoker Efficiency, H. H. Baumgartner. Nat. Engr., vol. 31, no. 6, June 1927, pp. 263–266, 3 figs. Stratification of furnace gases under different operating conditions; functions of furnace arches in chain-grate stoker furnaces; preheated air and its practical applications.

Pulsatory Combustion. Process for Better Utilization of Fuel (Verfahren zur besseren Ausnutzung der Brennstoffe), Franke. Wärme, vol. 50, no. 9, Mar. 4, 1927, pp. 174–175. Explains how pulsatory combustion in boiler furnaces may be obtained by inducing pulsations in flue gases; annular ring mounted in flue carries, on side away from furnace, a scroll-formed support with cup-shaped cowl at other end; part of gas flows through openings in outer circumference, but most of flow is through center of ring past scroll into cup or cowl; vigorous eddying is produced and vibration of scroll, which is communicated to cowl, results in pulsating draft being applied to furnace.

Radiant Heat, Effect of. Effect of Radiant Heat on Water-Cooled Furnace Walls, A. G. Christie. Power, vol. 65, no. 22, May 31, 1927, pp. 841–844, 4 figs. Discussion of what happens in water screens, water walls and first row of boiler tubes, velocities attained and probable rates of heat absorption.

BOILER OPERATION

Central Stations. Power House Boiler Operation, R. B. Mitchell. World Power, vol. 7, no. 42, June 1927, pp. 319–325, 6 figs. After showing differences between boiler-house operation in electricity-supply industry and that practice in other industries, author outlines modern methods in typical large-scale generating station, laying stress on necessity for ascertaining accurately amount of coal consumed; instruments to be installed and method of logging and recording readings.

BOILER PLANTS

Automatic Control. Automatic Control of Boiler Plants. Power, vol. 65, no. 22, May 31, 1927, pp. 814–817, 9 figs. Boiler-plant automatic control, by which all boilers in plant may be controlled as unit, has made rapid advances during last few years; describes number of these systems.

An Interesting American Small Boiler Plant Operating Under Complete Automatic Control, C. J. Auclair. Eng. & Boiler House Rev., vol. 40, no. 11, May 1927, pp. 553–555, 3 figs. 200-hp. boiler plant at Woonsocket, which is operating with oil as fuel; control both of burners and feedwater are completely automatic.

Auxiliary Drive. Drives for Power Plant Auxiliaries, F. T. Leilich. Iron & Steel Engr., vol. 4, no. 5, May 1927, pp. 218–225 and (discussion) 225–229, 14 figs. No general statement as to what is best can be made, as conditions are different for practically every case; numerous factors contributing to increase in use of electricity.

Equipment. Industrial Boiler Plant, D. Brownlie. World Power, vol. 7, no. 41, May 1927, pp. 261–270, 13 figs. Deals with plant, machinery and appliances; and control by means of water meters, steam meters, coal weighers, flue-gas analyzing machines, pyrometers and similar appliances.

Recent German Developments in Equipment for Boiler Plants. Nat. Engr., vol. 31, no. 6, June 1927, pp. 273–275, 7 figs. Steam-pressure transformers for delivering steam at various pressures; damping valves for boiler-feedwater lines; exhaust steam-pressure regulators for small turbines; storage heaters for boilers in blast-furnace plants. Translated from series in V.D.I. Zeit. published in 1925.

Practice. Modern Boiler House Practice, J. T. Ruddock. Machy. Market, no. 1385, May 20, 1927, pp. 21–22. Deals with brickwork, furnace-wall design, side sealing, running with minimum supply of air, growth of cast-iron links. Paper read before Bradford Eng. Soc.

BOILER PLATE

Electric Arc Welding. Arc Welding of Boiler Plates, N. Shaposhikoff, G. Kastzenko and K. Jourieff. Inst. Economic Mineralogy & Met.—Trans., no. 31, 1927, 76 pp., 25 figs. Strength tests, chemical analysis and metallographic studies of V and double-V welds, made at Mining and Metallurgical Laboratory of Leningrad; joining plates, new with new and old with old; results of strength and bending tests very satisfactory; favors V joint for thinner plates, double V for thicker; commends annealing but objects to hammering of welds. (In Russian.)

Embrittlement. Embrittlement of Boiler Plate, S. W. Parr and F. G. Straub. Am. Soc. Testing Matls.—advance paper, no. 29, for mtg. June 20–24, 1927, 15 pp., 4 figs. Term embrittlement of boiler plate, is defined as intercrystalline cracking in riveted areas; this difficulty is confined entirely to type of water supply or water treatment which brings about predominance of sodium carbonate over sodium sulphate; results of laboratory tests on reproduction of embrittlement by means of caustic solutions; these show that embrittlement will not proceed in absence of stress above yield point; no steel has been found that is resistant to any marked degree; heat treatment of boiler plate does not stop cracking; theory covering embrittling action is presented. See also Indus. & Eng. Chem., vol. 19, no. 5, May 1927, pp. 620–622, 5 figs.

BOILER TUBES

Reclamation. Most Efficient Methods of Reclaiming and Safe-ending Boiler Tubes and Flues. Boiler Maker, vol. 27, no. 5, May 1927, pp. 139–143, 10 figs. Abstract of Committee report presented to Master Boiler Makers' Assn.

BOILERS

Benson. 3300-Lb. Benson Boiler Operates Successfully. Power Plant Eng., vol. 31, no. 13, July 1, 1927, pp. 740–742, 5 figs. Results show exceptional safety in operation and favorable economy for new 2200-hp. boiler under construction for Siemens-Schuckert Works in Berlin.

Blow-Off System. Design and Operating Problems of the Boiler Blow-Off System, C. L. Hubbard. Nat. Engr., vol. 31, no. 6, June 1927, pp. 257–261, 5 figs. Practical suggestions on proper methods of blowing down boiler, how to maintain proper concentration of boiler water and suggestions on installation of boiler blow-off combinations.

Convertible Gas or Coke-Fired. A Cochran Convertible Gas or Coke Fired Boiler, W. S. Johnston. Gas Jl., vol. 178, no. 3339, May 18, 1927, pp. 436–437. Instead of being usual single-run type of cross-tube boiler, it has three runs; boiler has three openings into combustion chamber, one for stoking with solid fuel, and two for firing gas burners; results of experiments.

Corrosion. Boiler Corrosion and Pitting. Boiler Maker, vol. 27, no. 5, May 1927, pp. 138–139. In its search for information as to progress in combating evils of pitting and corrosion, committee sent out questionnaire to which 39 replies were received. Abstract of report presented to Master Boiler Makers' Assn.

Drum Manufacture. Manufacture of High-Pressure Boiler Drums. Iron Age, vol. 119, no. 18, May 5, 1927, p. 1300. Welding of longitudinal seams $3\frac{1}{2}$ in. thick and upsetting of ends to close in head; methods of Thyssen firm in Germany.

Electric. Load Control on Electric Steam Boilers, C. R. Reid. Power, vol. 65, no. 24, June 14, 1927, p. 911, 2 figs. Electric boiler started cold with clean water at minimum level will have initial input about 10 per cent of normal rating; continuous operation at 25 per cent rating is about as low as is practicable, because amount of bleeder water becomes excessive.

Failures. Boiler Failures. Engineering, vol. 123, no. 3199, May 6, 1927, pp. 552–553. Review of memorandum by C. E. Stromeyer in which he gives list of exhibits in his museum and valuable comments upon them; prominence is given to subject of uniform wasting; case of scale falling off two furnaces of Lancashire boiler and forming bed of loose sediment on front end of shell; introduction of caustic soda or carbonate into boilers for anti-corrosion or anti-scale purposes is generally accepted as almost certain cause of failure, owing to embrittling action of these substances.

French Code. French Regulation for Boilers Other Than Marine (Portant Règlement sur les Appareils à Vapeur autres que ceux placés à bord des Bateaux). Associations Françaises de Propriétaires d'Appareils à Vapeur—Bul., vol. 8, no. 27, Jan. 1927, pp. 1–72. Gives complete revision of code for boilers and pressure vessels; present code replaces those of 1907, 1910, 1919 and 1920; deals with design and construction of apparatus and execution of repairs; use of cast iron and steel is forbidden; recommendations for design; acceptance tests; safety apparatus and measures; includes earlier recommendations dating from 1898.

Heads. Calculation of the Plate Thickness of Dished Heads and Knuckles According to the Hamburg Rules, A. Huggenberger. Mech. Eng., vol. 49, no. 6, June 1927, pp. 629–632, 6 figs. Stress conditions in elliptical shells are established from theoretical and experimental analyses; on basis of relation between radius of curvature in maximum stresses, danger of rupture in small-radius boiler knuckles is approximately determined; calculation of thickness of plate according to Hamburg rules is discussed and it is shown that use of too small value for radius of knuckle will give too small value for thickness of plate; appropriate head tension can be so shown that usual calculations will give correct thickness of plate. Translated from V.D.I. Zeit., vol. 69, no. 6, Feb. 7, 1925, pp. 159–162.

Experiments on the Resistance and Change of Shape of Boiler Heads, C. Bach. Mech. Eng., vol. 49, no. 6, June 1927, pp. 635–636, 5 figs. Experiments cover six boiler heads of elliptical cross-section; six boiler heads of usual shape; four boiler heads of shape designed by Klopper. Translated from V.D.I. Zeit., vol. 69, no. 12, Mar. 21, 1925, pp. 367–368.

Maintenance. The Maintenance of Boilers (L'Entretien des chaudières à vapeur), M. Varinois. Pratique des Industries Mécaniques, vol. 10, no. 2, May 1927, pp. 45–54, 10 figs. Discusses best method of equipment for maintenance of different types of boilers; removal of scale; deterioration of boilers; external and internal corrosion.

Pressure Unit. Hectopièze, a New Pressure Unit (L'hectopièze, nouvelle unité de pression). Associa-

tions Françaises de Propriétaires d'Appareils à Vapeur —Bul., vol. 8, no. 27, Jan. 1927, pp. 73–75. New unit for measurement of pressure introduced in France; it is a little larger (2 per cent) than old unit; to change from one to other it is necessary to multiply or divide by 0.981.

BRAKES

Band. Band or Strap Brakes, Corliss. Mech. World, vol. 81, no. 2108, May 27, 1927, p. 371, 1 fig. Author seeks to show that, with help of accompanying table, calculation of brake effort given by existing brake or design of new one, can be effected in few minutes.

BRICKMAKING

Heat Economy. Heat Economy in the Sand-Lime Brick Industry (Die Syndikatsbewegung in der rheinischen Ziegelindustrie), C. Frohn. Tonindustrie-Zeitung, vol. 51, no. 33, Apr. 23, 1927, pp. 571–572. Describes changes made at Falkenberg sand-lime brick plant, Germany, through which effective heat economies were brought about, total capacity being 31,000 brick; when brick have hardened sufficiently and are removed from tunnel, steam is forced into another tunnel; such steam as may remain after this is directed into preheater where water is heated; this preheated water is led to high-pressure storage stand; boiler feedwater entering boiler from high-pressure tank has temperature of 100 to 120 deg. cent.; this utilization of heat has made it possible to produce 60,000 brick a day with boiler of 646 sq. ft., which is an indication of heating at maximum capacity.

C

CAMS

Circular-Arc. Graphical Analysis of Circular-Arc Cams—Discussion, G. L. Guillet. Am. Mach., vol. 66, no. 24, June 16, 1927, pp. 1012–1013, 2 figs. Supplementary to author's previous articles, and to remarks of Schreck on p. 322, vol. 66.

CAR WHEELS

Solid Rolled-Steel. The Manufacture of Solid Rolled Steel Car Wheels, G. A. Richardson. Ry. & Locomotive Eng., vol. 40, no. 5, May 1927, pp. 137–138. Steel is cast into large ingots which are rolled in 32-in. mill to round blooms of diameter to suit best size and type of wheel to be made; blooms are sheared hot with rotary shears into blocks of desired length; steps in manufacturing; inspection and machining.

CARBON

Combustion. The Combustion of Solid Carbon, R. T. Haslan. Eng. & Boiler House Rev., vol. 40, nos. 7 and 11, Jan. and May 1927, pp. 355–360 and 580–582, 2 figs. Deals with reaction $C + O_2 = CO_2$, and summarizes and discusses information in literature on mechanism of reaction and factors determining its rate. Paper read before Instn. Fuel Technology.

CAST IRON

Blowholes. The Macrostructure and Microstructure of Blowhole Segregation (Die Makro- und Mikrostruktur von Gasblasenseigerungen), A. Wimmer. Stahl u. Eisen, vol. 47, no. 19, May 12, 1927, pp. 781–786, 23 figs partly on supp. plates. Describes occurrence, origin and chemical composition of blowhole segregations, their structure, behavior of carbon, phosphorus and ferrite with secondary crystallization.

Handling and Melting. Handling and Melting Gray Iron. Iron Age, vol. 119, no. 22, June 2, 1927, pp. 1587–1590, 5 figs. Washing-machine plant has several novel features in continuous-pour foundry; double-magnet crane.

Welding. The Welding of Cast Iron, P. L. Roberts. Welding Jl., vol. 24, no. 282, Mar. 1927, pp. 70–76, 11 figs; and (discussion), no. 283, Apr. 1927, pp. 102–106. Both metallic and carbon arc, and oxyacetylene processes are used, each having field for which it is specially suitable; other processes such as resistance, butt and spot welding are neither successful nor suitable means for welding cast iron; thermit welding may be used with advantage in very few cases; metallurgical and mechanical properties of cast iron; expansion and contraction; free castings; semi-rigid and rigid castings.

CASTING

Centrifugal. Centrifugal Casting of Steel, L. Cammen. Am. Soc. Steel Treat.—Trans., vol. 11, no. 6, June 1927, pp. 915–949 and (discussion) 950–958. First part deals with centrifugal tube casting; its present and prospective field of application and limitations, particularly where centrifugal tube casting comes into competition with piercing process; second part is devoted to new art of centrifugal bar casting, affecting entire steel industry; its importance lies in its ability to produce metal of better quality at cost estimated to be from \$3.50 to \$8.50 per ton lower than present methods; mechanical and metallurgical features of process and machinery employed.

Ship Propeller. Production of a Three-Blade Ship Propeller in Metal Wet-Casting Process (Herstellung einer dreifluglіgen Schiffsschraube im Metall-Nassgussverfahren), M. Schied. Zeit. für die Gesamte Giessereipraxis (Metal), vol. 48, no. 16, Apr. 17, 1927, pp. 65–66. Describes casting of a propeller weighing 130 kg., making extensive use of old material.

CASTINGS

Defects. What Causes Common Defects in Castings? J. W. Bolton. Foundry, vol. 55, nos. 4 and 10, May 1 and May 15, 1927, pp. 357–360 and 403–405, 16 figs. Several typical casting defects have been selected, their appearance defined, their method of formation explained and possible remedies suggested.

CENTRAL STATIONS

Bayside, Wis. New Bayside Station Aids Wisconsin Hydro Plants. Power Plant Eng., vol. 31, no. 11, June 1, 1927, pp. 596–604, 11 figs. Plant is designed with no spares in main units, which consist at present of two 10,000-kw. turbines bled for feedwater heating and two single-pass boilers with air preheaters and water-cooled furnaces fired by unit pulverizers.

Crawford Ave., Chicago. High Steam Pressure and Temperature at Crawford Avenue Station, A. D. Bailey. Am. Soc. Mech. Engrs.—advance paper, for mtg., May 23–26, 1927, 18 pp., 7 figs. Problems encountered in operation of station of Commonwealth Edison Co., designed for 550-lb. steam pressure at turbines and 725 deg. fahr. temperature; fuel used is Central Illinois coal, having average heat value of 10,255 B.t.u.; this is fired on forced-draft, chain-grate stokers.

Design. Present Tendencies of Steam-Station Design, V. E. Alden. Mech. Eng., vol. 49, no. 6, June 1927, pp. 603–608. Improvements since 1913; higher steam pressures and temperatures; use of economizers; effect of stage bleeding for feedwater heating on turbine design; use of air preheaters; furnace design; improved methods of burning coal; increase in size of equipment; future possibilities.

East River, New York City. The East River Generating Station of the New York Edison Company. Gen. Elec. Rev., vol. 30, no. 5, May 1927, pp. 238–260, 30 figs. Location determined by load requirements; difficulties overcome in planning and construction; fuel-handling and preparation facilities; tube-boiler furnace; layout and equipment of turbine room; electrical distribution equipment, its connections and arrangements; power supply and protection of house auxiliaries.

Edgar, Boston. High-Pressure Steam at Edgar Station, I. E. Moultrop and E. W. Norris. Am. Soc. Mech. Engrs.—advance paper for mtg., May 23–26, 1927, 16 pp. Design of generating plant for Edison Electric Illuminating Co. using steam at 1200 lb. which was first in United States to use pressures of this magnitude; describes extension to station and gives results of experiences with original plant as applied to design of extension; comparison of space requirements of high- and low-pressure equipment.

Pioneer Experiences at Edgar Station, G. R. Davison and R. E. Dillon. Power Plant Eng., vol. 31, no. 11, June 1, 1927, pp. 605–608, 5 figs. Majority of difficulties predicted for this pioneer high-pressure installation did not materialize.

High-Pressure. High-Pressure Power-Station Design in the Middle West, F. S. Collings. Power, vol. 65, no. 23, June 7, 1927, pp. 869–872, 6 figs. Outstanding points of interest showing why 500 to 600 lb. is most economical steam pressure for large stations, gain from reheat and air preheating, including pointers on choice of fuel-burning equipment, water vs. air-cooled furnaces, evaporators and relative merits of closed feedwater system as against flash system for deaeration of boiler feedwater.

Middle West. Steam-Station Development in Middle West, C. S. Tomlinson. Mech. Eng., vol. 49, no. 7, July 1927, pp. 765–767. Peculiarities of steam-station development in Middle West are scarcity of desirable plant sites due to lack of condensing water, scattered load, and variety of fuels.

South Wales. Recent Extensions at Treforest (Upper Boat) Power Station. Elec. Times, vol. 71, no. 1854, May 5, 1927, pp. 610–612, 2 figs. In this station bulk of energy supplied throughout company's area, which embraces, with certain restrictions, whole of Glamorgan and that part of Monmouthshire west of River Usk, is generated.

CHARCOAL

France. Charcoal Resources of France (Ressources de la France en charbon de bois), M. Arnould. Annales de l'Office National des Combustibles Liquides, vol. 1, no. 3, 1926, pp. 517–521. Study of question of use of charcoal as national fuel in France.

CHROMIUM STEEL

Corrosion. Methods to Investigate Rapidity of and Susceptibility to Corrosion of High-Grade Steel, with Special Reference to Origin of Corrosion in Stainless Steel (Untersuchungsmethoden über die Rostgeschwindigkeit und -neigung von Qualitätsstählen mit besonderer Berücksichtigung der Korrosionsquellen an rostsicheren Chromstählen), V. Duffek. Korrosion u. Metallschutz, vol. 3, no. 3, Mar. 1927, pp. 49–53, 4 figs. Author seeks to demonstrate adaptability of certain investigating methods.

CHUCKS

Automatic. Potter & Johnston "Power-Flex" Model 5-D Automatic Chucking and Turning Machine. Am. Mach., vol. 66, no. 21, May 26, 1927, pp. 909–910, 2 figs. Machine is of unit construction, and all major parts are assembled separately and bolted to base, so that each unit is readily accessible.

Gear. Cotta Gear Chuck. Machy. (N. Y.), vol. 33, no. 10, June 1927, pp. 797–798, 2 figs. Chuck designed for holding gears at pitch line to permit boring, reaming or grinding them concentrically with pitch circle.

COAL

Calorific Value. Determination of the Calorific Value of Coal (Heizwertbestimmungen von Kohlen), A. Brüser. Brennstoff- u. Wärmewirtschaft, vol. 9, nos. 6 and 7, Mar. and Apr. 1927, pp. 125–128 and 152–156, 4 figs. Results of author's investigations and apparatus employed; moisture determination; combustion in bomb.

Carbonization. Coal Washing and Carbonization in the Mines of La Loire and Roche-la-Molière (Le lavage et la carbonisation de la houille aux mines de la Loire et de Roche-la-Molière), C. Berthelot. Société des Ingénieurs Civils de France—Mémoires et Compte Rendu des Travaux, vol. 79, no. 9–10, Sept.-Oct. 1926, pp. 792–819, 11 figs. Progress in France in coal washing with complete elimination of waste; in mines of La Loire there are 122 coke ovens with most modern equipment for recuperation and treatment of by-products, ammonia, benzol and distillation of tar.

The K. S. G. Process for Low Temperature Coal Carbonization. Gas Age-Rec., vol. 59, no. 20, May 14, 1927, pp. 707–708, 1 fig. Process was developed in Europe and large unit has been in satisfactory commercial operation at Essen, Germany, for 2 years; principal feature is double revolving drum retort, outer shell of which has diameter of 10 ft. and is 76 ft. in length; retort is constructed in such way that inside drum, which is kept cool by continuously incoming coal, is carrier for whole structure, outer shell which becomes highly heated, being loosely fitted to inner shell.

Low Temperature Carbonization of Coal, R. M. Crawford. Blast Furnace & Steel Plant, vol. 15, no. 5, May 1927, pp. 229–233. Various systems for carrying on process and operating features, which differentiate them; economies make process attractive. Paper read before Prime Movers Committee, N.E.L.A.

The Turner Low-Temperature Carbonisation Plant. Engineering, vol. 123, no. 3199, May 6, 1927, pp. 559–561, 7 figs. Describes plant in operation at works of Comac Oil Co., employing system developed by C. Turner; first commercial application of his methods.

Coking. Coking (Contribution à l'étude du mécanisme de la transformation de la houille en coke), E. Audibert and L. Delmas. Chimie & Industrie, vol. 17, no. 3, Mar. 1927, pp. 355–366, 17 figs. Study, illustrated with photomicrographs, of mechanism of coking; curves are shown in which volume increase is plotted against time and against temperature; structure of coke was studied with respect to effect of time, temperature and uniformity of heating, nature of original coal being duly considered.

Distillation. Coal Distillation Is an Economic Problem, W. Runge. Power Plant Eng., vol. 31, no. 12, June 15, 1927, pp. 664–665. Type of coal, distillation process, cost of raw material, geographical location of market and effect of large production on price of by-products must be considered. Abstract of paper presented before Kansas City A.S.M.E. regional meeting.

Combustion. The Combustion of Coal (Das Verbrennen der Kohle), K. Schreber. Dinglers polytechnisches Jl., vol. 108, no. 9, May 1, 1927, pp. 97–102, 1 fig. Results of investigation showed that coal on grate at ordinary grate temperatures burns only with aid of CO_2; only with very high temperature, such as in blast furnaces and similar works, does coal burn direct with oxygen and then only to CO.

Hydrogenation. The Bergius Process of the Hydrogenation of Coal. Fuel, vol. 6, no. 5, May 1927, pp. 213–216, 4 figs. Development of process up to present time may be divided into four periods representing different stages of improvement: (1) experimental stage; (2) experiments with intermittent process; (3) experiments with continuous process; (4) construction of large-scale plant. Translated from Neue Deutsche Bergbau-Zeitung, no. 25, pp. 9–10.

Moisture and Combustion. The Relationship of Moisture to Combustion, W. D. Wylde. Eng. & Boiler House Rev., vol. 40, no. 11, May 1927, pp. 557–565, 6 figs. Endeavor has been made to show true, distinct from fictitious, assets of moisture in and on coal as fired for commerical production of steam, without deviating intentionally from heat-economy fundamental invo ved in concise and deliberate recognition of those controlling facts which govern economy.

Specifications. Report of Committee D-5 on Coal and Coke. Am. Soc Testing Matls.—advance paper, no. 62, for mtg., June 20–24, 45 pp., 9 figs. Proposed standard definitions of terms relating to coal and coke; determination of sulphur in coal and coke by bomb-washing and sodium-peroxide fusion methods; laboratory sampling and analysis of coal and coke; methods of analysis; determination of phosphorus in ash.

COAL MINES

Air Conditioning. Local Air-Conditioning Underground, W. Hancock. Iron & Coal Trades Rev., vol. 114, no. 3090, May 20, 1927, pp. 824–825, 4 figs. Efficiencies of small auxiliary ventilating units. Abstract of committee report presented before Inst. Min. Engrs.

COAL MINING

Machine Loading. Better Management Needed to Make Loading Machines Successful, L. E. Young. Coal Age, vol. 31, no. 19, May 12, 1927, pp. 666–669, 5 figs. Introduction of mechanical loading devices means specialization of tasks; successful mechanical loading results in concentration of working places, and where shooting is permitted during working shift much more rapid extraction of blocks of coal is possible; mine telephones indispensable.

COKE

Formation. The Formation of Coke, G. E. Foxwell. Gas World, vol. 86, no. 2235, June 4, 1927, pp. 10–14. Behavior of coal at temperatures below 350 deg. cent. and between 350 and 500 deg.; changes during plastic stage; action in plastic stage at constant temperature; surface flow; formation of pores;

French views: reactions and physical changes occurring above 500 deg.

A Study of Coke Formation, R. A. Mott. Fuel, vol. 6, no. 5, May 1927, pp. 217–231, 1 fig. Theory of surface flow of solids; application to coke formation; application of experimental study.

Ignition and Combustion. Determination of the Relative Ignitibilities and Combustibilities of Domestic Cokes: Some Tests on the Possibilities of a "Brazier and Weighing Method," T. F. E. Rhead and R. E. Jefferson. Chem. & Industry, vol. 46, no. 18, May 6, 1927, pp. 166T–172T, 12 figs. Progress of coke fire; factors influencing burning of coke in domestic grate; possibilities of weighing method have been partly investigated for differentiating between ignitibilities and combustibilities of different cokes for domestic use; loss in weight involves moisture and volatile matter as well as loss by combustion; influence of size of coke, grade, height of fire and natural draft are clearly demonstrated.

Properties. Some Properties of Coke, J. W. Cobb. Nature (Lond.), vol. 119, no. 3003, May 21, 1927, pp. 751–753. Ash constituents; reactivity in CO_2 and air; heating of coke in air; industrial and domestic applications. Substance of two lectures delivered at Royal Inst.

COMPRESSED AIR

Fixtures. Fixtures Operated by Compressed Air. Machy. (Lond.), vol. 30, nos. 757 and 762, Apr. 14 and May 19, 1927, pp. 42–44 and 201–204, 8 figs. Apr. 14: Valve for controlling air-operated fixture; fixture for counterboring operation; air-operated chuck. May 19: Air-operated stamping press, milling fixture actuated by compressed air, and air-adjusted semi-automatic machine. See also Machy. (N. Y.), vol. 33, nos. 8 and 9, Apr. and May 1927, pp. 590–593 and 673–676, 8 figs.

CONNECTING RODS

Articulated. The Articulated Connecting Rod, J. Morris. Roy. Aeronautical Soc.—Jl., vol. 31, no. 196, Apr. 1927, pp. 343–344, 1 fig. Observations on papers of Fearn and Farren published in Feb. issue of Journal.

CONVEYORS

Types. Mechanical and Continuous Handling of Diversified Products, E. J. Tournier. Indus. Mgmt. (N. Y.), vol. 73, no. 6, June 1927, pp. 328–333, 6 figs. Discusses uses of different types of conveyors in various industries.

CORES

Core Oil. Core Oil Specifications, V. A. Crosby. Am. Foundrymen's Assn.—advance paper, no. 12, for mtg. June 6–10, 1927, 6 pp. Properties of core oils which are examined to determine quality of oils purchased; specifications used are listed and reasons for items of specifications are discussed.

Dry-Sand. The Effects of Moisture Absorption on the Properties of Dry-Sand Cores, H. L. Campbell. Am. Foundrymen's Assn.—advance paper, no. 14, for mtg., June 6–10, 1927, 8 pp., 1 fig. Investigation made to determine changes in strength and permeability of dry-sand cores when placed in green-sand molds for different periods of time; conclusions reached were that deterioration in strength is dependent on type of binders used and length of time left in moist mold; permeability is not changed on exposure to moist air for periods of time up to 25 hours and amount of moisture absorbed by dry-sand cores from green-sand molds is relatively small.

CORROSION

Atmospheric. Second Experimental Report to the Atmospheric Corrosion Research Committee (British Non-Ferrous Metals Research Association), W. H. J. Vernon. Faraday Soc.—Trans., vol. 23, no. 74, Apr. 1927, pp. 113–185 and (discussion) 185–204, 33 figs. Indoor exposure tests and laboratory experiments; open-air exposure tests; methods used for analysis of corrosion products.

Detection and Cure. Finding and Curing Corrosion, C. E. Joos. Power, vol. 65, no. 21, May 24, 1927, pp. 768–772, 7 figs. Author tells how to go about finding out what is causing corrosion, where trouble begins and how to cure it; recirculation to prevent oxygen corrosion; use of soluble chromates prevents corrosion; use of brass piping; deaerators.

Differential Aeration. Differential Aeration Corrosion Theory, W. B. Lewis and C. S. Irving. Eng. & Boiler House Rev., vol. 40, no. 11, May 1927, pp. 583–584. Water-level corrosion; factors which influence corrosion; calcium nitrate, calcium chloride, magnesium chloride, magnesium nitrate, carbonic-acid gas and oxygen, are chief corrosive substances in boiler feedwaters, and it is their influence and effect which have to be neutralized if corrosion is to be prevented.

CRANES

Gear Drive. Worm Drive for Steel Mill Units. Iron Age, vol. 119, no. 22, June 2, 1927, pp. 1603–1604, 1 fig. Advantages claimed in use of worm gearing for ladle crane and charging machine; roller bearings used, also.

Plate-Lifting. Plate-Lifting Cranes with Suction Attachment. Indus. Mgmt. (Lond.), vol. 14, no. 5, May 1927, pp. 163–164, 4 figs. Methods by which non-magnetic plates are successfully handled by use of suction cups.

CRANKCASES

Machining. Crankcase Fixtures and Methods, F. H. Colvin. Am. Mach., vol. 66, no. 22, June 2, 1927, pp. 935–937, 9 figs. Methods and equipment employed in Buffalo plant of Pierce-Arrow Co.

CUTTING TOOLS

Circular Form. Circular Form Tools, J. W. Hayes. Machy. (Lond.), vol. 30, no. 756, Apr. 7, 1927, pp. 5–7, 2 figs. Presents formulas and charts for calculating tools used when cutting brass.

Cutting Force. New Method for Measuring the Cutting Force of Tools and Some Experimental Results, M. Okochi and M. Okosi. Soc. Mech. Engrs. (Japan)—Jl., vol. 30, no. 120, Apr. 1927, pp. 163–203, 44 figs. For measuring cutting force exerted on tools very exactly, authors have attempted to apply piezo-electricity and invented new apparatus for lathe tool, drill and milling cutter; experimental results on lathe tool; magnitudes of three components of cutting force are compared at various areas of cut; secondarily, effects of tempering, area of cut, cutting speed, and cutting angle on cutting force; cutting temperature and effect of lubricant and tempering on durability of tool and smoothness of work surface.

Strength. The Strength of Cutting Tools. Mech. World, vol. 81, no. 2108, May 27, 1927, pp. 375–376, 4 figs. Ordinary single-edged tools of simple form practically depend for strength on cross-section of steel; many tools and cutters of normally sufficient strength are weakened by grinding too much clearance; sharp corners and angles are fruitful causes of fracture either in hardening and tempering or when cutting commences.

CYLINDERS

Hydraulic. Maintaining Hydraulic Cylinders. Power Engr., vol. 22, no. 255, June 1927, pp. 226–227. Hydraulic cylinders are liable to unavoidable troubles, such as leakage and stiffness; how these may be easily remedied.

D

DIES

Blanking. Paper Tests for Blanking Dies, H. Simon. Machy. (Lond.), vol. 30, no. 761, May 12, 1927, p. 179, 1 fig. Method of testing die; practical application of paper test; recording graphical records of condition of blanking dies. See also Machy (N. Y.), vol. 33, no. 9, May 1927, pp. 687–688, 1 fig.

Segmental Laminations. Dies for Segmental Laminations, P. J. Edmonds. Forging—Stamping—Heat Treating, vol. 13, no. 5, May 1927, pp. 170–172, 8 figs. Production of laminations for electrical equipment, as practiced on large scale, is explained.

DIESEL ENGINES

Acro. Air-Storage Diesel Engine of Robert Bosch Corp. (Der Luftspeicher-Dieselmotor von Robert Bosch, A.-G.), R. Stribeck. V.D.I. Zeit., vol. 71, no. 22, May 28, 1927, pp. 765–774, 30 figs. Details of Acro engine, outstanding feature of which is triple-section condensing chamber; results of investigations, which consisted mainly of temperature measurements, visualized internal process; enumerates most important properties, especially with regard to its use as automobile engine. See Translation in Engineering, vol. 123, nos. 3204 and 3206, June 10 and 24, 1927, pp. 699–701 and 779–781, 13 figs.

Airless-Injection. A. E. G.-Hesselman Airless-Injection Engine, F. Sass. Brit. Motorship, vol. 8, no. 86, May 1927, pp. 57–59, 7 figs. New type of compressorless Diesel engine has for its object utilization of heavy oil with effective combustion, and possesses number of noteworthy features of construction, resulting in effective pulverization and highly satisfactory penetration of fuel with air of combustion.

Automotive. The Diesel Engine as Automotive Engine (Die Dieselmaschine als Kraftfahrzeugmotor), K. Neumann. V.D.I. Zeit., vol. 71, no. 22, May 28, 1927, pp. 775–785, 21 figs. Results of author's investigation of Diesel as automotive engine, in order to determine possibilities of its development for this purpose; work process of Diesel automotive engine; results of tests of Dorner engine.

Combustion Chambers. Experimental Combustion Chambers Designed for High-Speed Diesel Engines, C. Kemper. Am. Soc. Mech. Engrs.—advance paper, for mtg., May 23–26, 1927, 14 pp., 8 figs. Preliminary requirement for high-speed fuel-injection engine problem; analyses of cycles used in this type of engine; effect of increasing speeds on output of engines employing these cycles; requirements of combustion chambers; results of experiments using three different types; curves showing performance of engine when equipped with each of special types of chambers.

Heavy-Oil. Heavy-Oil Engines in 1927 (Les moteurs à huiles lourdes en 1927), M. Arsene-Henry. Technique Moderne, vol. 19, no. 11, June 1, 1927, pp. 321–327, 23 figs. Review of developments; semi-Diesel and super-Diesel engines; high-power marine Diesels; application of Diesels to traction.

Lubrication. Diesel and Oil Engine Lubrication. Mar. News, vol. 13, nos. 11 and 12, Apr. and May 1927, pp. 46–47 and 59–60 and 72–73 and 77. Apr: Problems encountered; power-cylinder lubrication; temperature of oil film; pressure effects on oil film; carbon deposits; scale in water jackets. May: Air-compressor cylinder.

M.A.N. Another Firm Builds Large Diesel. Power, vol. 65, no. 24, June 14, 1927, pp. 909–911, 3 figs. Double-acting M.A.N. Diesel built by Hooven-Owens-Rentschler; novel scavenging design; engine ran through acceptance test without difficulty.

McLaren-Benz. McLaren-Benz Diesel Engines, J. and H. McLaren. Mech. World, vol. 81, no. 2107, May 20, 1927, pp. 358–359, 3 figs. Engines are of 4-stroke airless-injection type.

Power Generation. Diesel Engines for Power Generation. Elec. News, vol. 36, no. 10, May 15, 1927, pp. 37–40. Construction and operating costs for various installations trend toward 2-stroke-cycle double-acting engines in larger sizes; generator output limited to 80 per cent engine rating for better and cheaper operation.

Power Plants. Why the Panama Canal Bought Diesels. Power, vol. 65, no. 19, May 10, 1927, pp. 704–706, 4 figs. Reasons Diesel stand-by was preferred over steam; safety features of plant; engine dimensions; surprising test results. See also discussion in Universal Engr., vol. 45, no. 5, May 1927, pp. 17–23, 12 figs.

Supercharging. Four-Stroke Cycle Oil Engines with Exhaust Gas-Turbine Supercharging (S.L.M.-Viertakt-Dieselmotoren mit Auspuffturbinen-Aufladung), A. Büchi. Schiffbau, vol. 28, no. 9, May 4, 1927, pp. 207–212, 6 figs. Swiss Locomotive & Engineering Co. of Wintherthur and Brown, Boveri, of Baden have carried out extensive tests on supercharging of 4-stroke engines by means of superchargers driven by exhaust-gas turbines; tests showed that with supercharge pressure of 0.5 atmosphere power of engine could be increased 50 per cent, still retaining exhaust temperatures usual with four strokes; method of supercharging has advantage of involving no auxiliary engine, and hence no additional fuel consumption; installation is quite distinct from main engine, and can always be run at economical speed. See translated abstract in Mar. Engr. & Motorship Bldr., vol. 50, no. 5, June 1927, p. 237.

DURALUMIN

Anodic Oxidation. The Anodic Oxidation Treatment of Duralumin, W. Nelson. Aviation, vol. 22, no. 24, June 13, 1927, pp. 1288–1289 and 1315, 4 figs. Treatment consists of oxidizing surface of part by making it anode in chromic-acid solution through which electric current is directed; it renders aluminum very resistant to corrosive influences; but full benefit of this type of oxidized surface is not obtained without use of final paint or varnish finish; disadvantage in treating individual pieces; treatment carried out in steel tank.

E

EDUCATION, ENGINEERING

Foundry Instruction. Professional and Technical Training in the Foundry Trade (L'Enseignement Professionnel et Technique de l'Industrie de la Fonderie A. Soupart. Fonderie Moderne, vol. 21, May 10, 1927, pp. 115–119, 1 fig. Studies means of promoting and assuring success of training.

Shop Courses. Shop Courses at the University of Washington, G. S. Schaller. West. Machy. World, vol. 18, no. 5, May 1927, pp. 201–203, 4 figs. It has been possible to lay out different shop divisions in logical sequence of raw-material flow from foundry to assembly floor; courses offered by department are designed to comprise practically every phase of activity included in modern metal-production plants.

ELECTRIC WELDING, ARC

Replacing Castings by. Replacing Castings by Welded Steel Parts, J. F. Lincoln. Am. Welding Soc.—Jl., vol. 6, no. 4, Apr. 1927, pp. 33–41, 7 figs. Considers problems involved.

Structural. Modern Structural Industry Demands a Knowledge of Arc-Welding, C. J. Holslag. Am. Welding Soc.—Jl., vol. 6, no. 4, Apr. 1927, pp. 82–88, 4 figs. Deals primarily with arc welding structural work.

ELECTRIC WELDING, RESISTANCE

Seams. Resistance Line Welding, H. W. Tobey. Am. Welding Soc.—Jl., vol. 6, no. 4, Apr. 1927, pp. 74–81, 7 figs. In case of seam or line welding, one of electrodes takes form of wheel, while other may be either roll or bar; width and strength of weld depend upon current, pressure and speed adjustments as well as upon size and shape and character of electrodes and metal being welded; examples of specific application of line welding; describes several types of machines in regular operation.

ELECTRICAL MACHINERY

Welded Steel Construction. Building Electrical Machinery Without Castings, G. S. Brady. Am. Mach., vol. 66, no. 26, June 30, 1927, pp. 1079–1082, 8 figs. General Electric Co.'s recently adopted policy of substituting welded steel construction for iron and steel castings in building of all of its large electrical machine units. See also description in Iron Age, vol. 119, no. 26, June 30, 1927, pp. 1881–1884.

EMPLOYEES

Outdoor Recreation. Outdoor Recreation for Industrial Employees. Monthly Labor Rev., vol. 24, no. 5, May 1927, pp. 1–16, 12 figs. Experience of certain cities as typical of attempts being made in many cities and towns to meet need for organized play among factory and office employees.

Selection and Placing. Vocational Guidance in Business, D. Fryer. Indus. Mgmt. (N. Y.), vol. 73, no. 6, June 1927, pp. 366–371. Practical application of psychology to selection and placing of employees.

EMPLOYEES' REPRESENTATION

Works Councils. The Austrian Works Councils Act in Practice, E. Adler. Int. Labour Rev., vol. 15, no. 4, Apr. 1927, pp. 519–546. Deals with two most important divergences of opinion between employers and employed as to interpretation of act, namely, works council's right to object to dismissal of worker or employee and immunity of members of works council.

EMPLOYEES, TRAINING OF

Disabled Workers. Training and Placement of Disabled Workers. Monthly Labor Rev., vol. 24, no. 5, May 1927, pp. 40–47. Progress in vocational rehabilitation; placement of handicapped in New York City.

Owner's Sons. Training the Owner's Son, W. A. Viall. Am. Mach., vol. 66, no. 21, May 26, 1927, pp. 891–892. Shows from long experience how this can be done with good effect on boys and also on employees.

ENGINEERING

Ancient Methods. Ancient Methods of Engineering, A. Sanborn. Tech. Eng. News, vol. 8, no. 3, Apr. 1927, pp. 118–119 and 150, 2 figs. Engineering features used in construction of Pyramids.

Consulting. Consulting Engineering as a Profession, D. C. Jackson. Purdue Eng. Rev., vol. 22, no. 4, May 1927, pp. 7–9. Importance of engineer to modern economic system; opportunities in future of consulting engineering practice.

EVAPORATORS

Vacuum-Exhaust. The Schmidt Vacuum-Exhaust Evaporator. Mar. Engr. & Motorship Bldr., vol. 50, no. 589, June 1927, pp. 215–218, 4 figs. German evaporator of new principle; many of latest German and Dutch passenger liners have been fitted with Schmidt evaporators and several cruisers and torpedo boats for German Admiralty; several units are also in service in various German power houses and electricity stations.

EXHAUST STEAM

Pressure-Raising Apparatus. A Steam-Pressure Transformer, L. S. Marks. Mech. Eng., vol. 49, no. 6, June 1927, pp. 600–602, 4 figs. Analysis of Koenemann's recently devised process for raising pressure of exhaust steam, and comparison showing its apparent advantages over mechanical method employing centrifugal compressor.

F

FARM MACHINERY

Wheels. Recent Developments in Agricultural Wheels, E. R. Wiggins. Agric. Eng., vol. 8, no. 3, Mar. 1927, pp. 49–51, 7 figs. Typical wheel designs; rubber-tired wheels.

FATIGUE

Industrial. Better Utilization of Human Effort and Industrial Fatigue (La meilleure utilisation de l'effort humain et la fatigue industrielle), L. A. Legros. Société des Ingénieurs Civils de France—Mémoires et Compte Rendu des Travaux, vol. 79, no. 9–10, Sept.-Oct. 1926, pp. 915–952, 2 figs. Points out that workers should know as much as possible concerning their particular task and results of discoveries should be made known to them; deals with theories of Taylor and Gilbreth; gives list of research work which might be usefully applied.

FEEDWATER HEATERS

Exhaust-Steam Injectors. The Exhaust Steam Injector. Ry. Gaz., vol. 46, no. 18, May 6, 1927, pp. 591–592. While live steam injector is universally admitted to be simplest boiler feeder for locomotives, it is not generally realized that exhaust injector is now equally as simple and reliable in working; velocity of exhaust steam; theory of design and economies in working; comparative tests.

Locomotives. Locomotive Feed Water Heating, W. C. Hamm. Eng. Jl., vol. 10, no. 6, June 1927, pp. 302–308, 16 figs. Its application and advantages, economies effected under operating conditions and description of various types of heaters in use.

FLOW OF AIR

Measurement. A Precision Method of Measuring Air Flow, J. A. Polson. Illinois Engr., vol. 3, no. 5, May 1927, pp. 1–2. In method described provision has been made for obtaining extreme accuracy in determining rate of flow of air in pounds per second or per minute; this is accomplished by actually weighing air in storage tank before and after test run; it can be used for very small rates of air flow, and when pressure on inlet side of orifice is above as well as when it is below atmospheric pressure.

FOREMEN

Bonuses. A Wage Incentive for Non-Productive Workers, A. Jensen, Jr. Indus. Mgmt. (N. Y.), vol. 73, no. 6, June 1927, pp. 334–337, 1 fig. Methods for determining amounts and kinds of bonuses for foremen.

FORGING

Aluminum Alloys. The Forging of Aluminum Alloys, J. Strauss. Forging—Stamping—Heat Treating, vol. 13, no. 5, May 1927, pp. 162–169, 4 figs. Methods for melting, forging, and heat-treating alloys of aluminum; preparation of ingots; properties of alloys; alloys of copper. Bibliography.

Die Inserts. Economical Possibilities of Die Inserts, G. H. Koskey. Forging—Stamping—Heat Treating, vol. 13, no. 5, May 1927, pp. 186–187. Discourse on forge-shop management with some positive expressions concerning value of die inserts.

FOUNDATIONS

Power Stations. Foundation Problems in the Construction of Power Stations and Substations in New York City, E. M. Van Norden. Brooklyn Engrs.' Club—Proc., vol. 25, Apr. 1927, pp. 18–37. General conditions of New York soil; regulations of New York Building Department; determination of subsurface conditions; waterfront foundations for power stations; inland foundations; research work in foundation design.

FOUNDING

Science in. The Role of Science in Founding (Le Role de la Science en Fonderie), Rabozée. Fonderie Moderne, vol. 21, Apr. 25, 1927, pp. 73–78, 14 figs. Mechanical tests; research; chemical and thermal analysis; metallography; it is author's opinion that progress can only be effected by coöperation between industry and science.

FOUNDRIES

Accident Prevention. The Foundry Accident Problem, W. G. Morgan. Foundry Trade Jl., vol. 35, no. 560, May 12, 1927, pp. 401–403. Fireproof clothing; defective ladle gearing; dangerous light rays; lighting of foundries; defective hoisting tackle; other types of accident.

Evolution Since 1900. Evolution of Founding Since 1900 (Evolution de la Fonderie depuis 1900), L. Thomas. Fonderie Moderne, vol. 21, Mar. 25 and Apr. 10, 1927, pp. 33–35 and 62–68. Mar. 25: Malleable castings; melting and treating equipment. Apr. 10. Types of melting furnaces; drying apparatus; foundry material and equipment, including sand, molding machines and materials-handling equipment. new foundry processes, including die casting and casting in permanent molds; large foundries of modern design.

Leipzig Fair. Foundry Practice and the Leipzig Fair (Giessereiwesen und Leipziger Messe), J. Mehrtens. Zeit. für die Gesamte Giessereipraxis, vol. 48, no. 16, Apr. 17, 1927, pp. 129–131. Describes some of outstanding foundry exhibits, including equipment and cast-iron processes.

Materials Handling. Saving Affected by Materials-Handling Equipment in Foundries (Transportersparnisse in Giessereien), A. Riebold. Giesserei, vol. 14, no. 20, May 14, 1927, pp. 321–325. Describes equipment which, without great initial expense, tends to reduce materials-handling cost; discussion of plants, installation of which involve large sums.

Handling Foundry Sand and Coke. Iron Age, vol. 119, no. 23, June 9, 1927, pp. 1660–1661, 5 figs. Plant of Maytag Washing Machine Co. has several unusual arrangements designed for minimum of interference; conveyor system unusually complete. See also article in no. 24, June 16, pp. 1738–1740, 6 figs., on Conveyors and Tempering Arrangements for Foundry Sand Mixing.

FOUNDRY MATERIALS

Blacking. Foundry Blacking, D. G. Anderson and A. N. Ogden. Am. Foundrymen's Assn.—advance paper, no. 6, for mtg. June 6–10, 1927, 10 pp., 8 figs. Discusses need for test for foundry blackings which will give definite idea of quality for foundry use; electrical conductivity may be used as commercial test for evaluating blacking; blacking selected as satisfactory according to electrical-resistance test has been found suitable for wet application in foundry when mixed with molasses and water and held in suspension by pneumatic agitator.

FUELS

Hog. Steam Generation with Hog Fuel, O. L. LeFever. Elec. Light & Power, vol. 5, no. 6, June 1927, pp. 117–119, 5 figs. Use of so-called "hog fuel" for steam generation as practiced in States of Oregon and Washington.

Research. The Fuel Research Station, C. H. Lander. Indus. Chemist, vol. 3, no. 27, Apr. 1927, pp. 162–171, 14 figs. Review of work carried out at Greenwich; survey of coal seams; high-temperature and low-temperature carbonization; hydrogenation of coal.

FURNACES, GAS

Industrial. Luminous and Non-Luminous Flame in Industrial Gas Furnaces (Leuchtende und nichtleuchtende Flamme in industriellen Gasfeuerungen), K. Huffelmann. Feuerungstechnik, vol. 15, nos. 13, 14, 15 and 16, Apr. 1, 15, May 1 and 15, 1927, pp. 145–146, 160–163, 174–176 and 186–187, 7 figs. Soot removal in flame as result of combustion; heat radiation of flame as result of radiation of gas molecules and solid carbon; calculation of flame radiation based on practical example.

FURNACES, METALLURGICAL

Heat Balance. Heat Balance (Le bilan thermique), E. Damour. Chaleur & Industrie, vol. 8, no. 85, May 1927, pp. 255–265. Example of heat balance of a Siemens furnace; evaluation of total calorific power and of calorific power remaining available in gas; results of measurements taken during six days.

G

GAS ENGINES

Ideal Cycles. Ideal Gas-Engine Cycles, R. C. H. Heck. Mech. Eng., vol. 49, no. 7, July 1927, pp. 771–780 and (discussion) 780–781, 12 figs. Develops working chart that combines in one temperature-entropy diagram and diagram of internal energy and total heat on entropy, in which any horizontal line is line of constant temperature, constant energy, and constant total heat; shows by trial upon representative examples that this chart, based on properties of average gas mixture, gives essentially correct output for any working mixture within range of gas-engine practice; present scheme employs principle of moving curves, carried by templets; chart carries one curve of constant volume and pressure and vertical scales of energy and total heat or "enthalpy."

GAS TURBINES

Nozzles. The Proportioning of Nozzles for Explosion Turbines, E. C. Wadlow. Engineer, vol. 143, no. 3725, June 3, 1927, pp. 600–602, 5 figs. Presents views of several authorities in order to obtain some idea of position up to date and what further work is necessary before satisfactory compromise is found.

GASES

Combustion. Gaseous Combustion at High Pressures, W. A. Bone. Roy. Soc.—Proc., vol. 115, no. A770, June 1, 1927, pp. 41–58, 5 figs. Spectrographic investigation of ultra-violet radiation from carbonic oxide-oxygen (or air) explosions.

Ignition Point. On the Ignition-Point of Gases at Different Pressures, H. B. Dixon and W. F. Higgins. Manchester Literary & Philosophical Soc.—Memoirs & Proc., vol. 70, no. 1, 1925–26, pp. 29–36. Preliminary account of experiments, made on behalf of Safety in Mines Research Board, on ignition points of gases in new form of concentric-tube apparatus designed to work under pressure above or below that of atmosphere.

GEAR CUTTING

Cutter Manufacture. Manufacturing Cutters for Gear Generators. Machy. (Lond.), vol. 30, no. 756, Apr. 7, 1927, pp. 10–12, 5 figs. Milling and grinding operations on cutters for Gleason machines.

Planers. Sunderland Gear-Planing Machine. Engineering, vol. 123, no. 3203, June 3, 1927, pp. 670–672, 9 figs. partly on p. 674. Design for cutting double helical gears up to 10 ft. in diameter and 24 in. face, with attachments for cutting spur gears with two cutters, and also for cutting spur and spiral gears with single cutter.

GEAR MANUFACTURE

Industrial Benefits. Development of Gear Making a Benefit to Entire Machinery Industry, Frost. Am. Mach., vol. 66, no. 21, May 26, 1927, p. 918d. Today there is insistence for better steels and other materials used in gears, and new alloys are continually being developed along with new methods of surface hardening to meet this demand; greater tensile strength and resistance to wear and fatigue are constantly sought. Presidential address to Am. Gear Mfrs.' Assn.

GEARS

Developments. Gear Design and Manufacture 1877 and 1927, E. Buckingham. Am. Mach., vol. 66, no. 20, May 19, 1927, pp. 866–867. Major advance in this art during past fifty years has been refinement of manufacturing processes and product; fifty years ago, cycloidal form was almost universally used as gear-tooth profile, today it is involute form; then, large percentage of tooth shapes were formed by hand, often from templates; cast teeth were commonly used on all large wheels except where mortice wheels with wooden cogs were employed; today, cut gear is standard; greater accuracy has brought with it longer life, greater strength and smoother, quieter operation.

Forged-Cast. Forged-Cast Gears. Am. Mach., vol. 66, no. 24, June 16, 1927, p. 1031. Hill Clutch Machine & Foundry Co., Cleveland, Ohio, has developed gear design using forged steel rim, in which teeth are cut, and semi-steel hub; construction is simply angular forged ring in which is cast hub either with web or arms, depending on dimensions.

Steel Standards for. Proposed Standards of Steel for Gears. Can. Machy., vol. 37, no. 19, May 12, 1927, p. 20. Presented for criticism and comment of Sub-Committee on gear materials, sponsored by American Gear Manufacturers' Association and A.S.M.E.

Sun and Planet System. A New Power Transmission Device. S. African Engr., vol. 16, no. 108, Apr. 1927, pp. 41–45, 2 figs. Device is invention of Frank Whittaker; on flywheel is mounted series of gear wheels each of which mesh with sun wheel in center; gear wheels are mounted on spindles carried by flywheel so that spindles rotate therewith.

Testing. Involute Gear Tester. Machy. (Lond.), vol. 29, no. 755, Mar. 31, 1927, pp. 838–839, 4 figs. Zeiss tester is designed for accurate testing of involute profile curve of gear teeth; instrument will accommodate all spur gears with involute teeth up to 16-in. diameter; it is also possible to determine base diameter of gear if this is not known, it being only necessary to find diameter which gives smallest deviation.

Tooth Loads. The Influence of Elasticity on Gear-Tooth Loads. Mech. Eng., vol. 49, no. 6, June 1927, pp. 644–649, 6 figs. Progress report no. 4 of A.S.M.E. special research committee on strength of Gear Teeth; perfect gears; static deformation of gear teeth; variation in load caused by static deformation; elasticity form factor. See abstract in Am. Mach., vol. 66, no. 21, May 26, 1927, p. 899.

The Influence of Elasticity on Gear-Tooth Loads. Mech. Eng., vol. 49, no. 7, July 1927, pp. 767–770, 4 figs. Progress report No. 5 of A.S.M.E. special research committee on strength of gear teeth; influence of errors on acceleration loads; separation of teeth because of acceleration; influence of normal-pitch errors.

Worm. Worm Gearing—Reply, H. E. Merritt. Machy. (Lond.), vol. 29, no. 753, Mar. 17, 1927, pp. 779–780. Under ordinary conditions of manufacture, worm with too small pressure angle, that is, with area of zero pressure angle inside projected area of wheel rim, may give rise to manufacturing difficulties, which can easily be avoided without sacrificing any desirable quality in finished gear by eliminating area of negative pressure angle. Reply to E. A. Limming's

criticism of author's series of articles in previous issues of this journal.

GREASES

Properties. Properties of Greases and Their Use for Lubrication, H. L. Kauffman. Belting, vol. 30, no. 5, May 1927, pp. 30–36. Four basic types of greases classified and described as to their ingredients, methods of manufacture and utility.

GRINDING

Plane Surfaces. Grinding of Plane Surfaces (Rectification des surfaces planes), Guenard. Arts & Metiers, vol. 80, no. 77, Feb. 1927, pp. 57–73, 35 figs. Examples of work executed on different types of grinding machines.

Surface. Surface Grinding Developments in Automotive Plants, C. O. Herb. Machy. (N. Y.), vol. 33, no. 9, May 1927, pp. 654–656, 7 figs. Operations in which predetermined amounts of stock are ground from parts in Osterholm machines.

Ways and Slides. Grinding Ways and Slides, L. Sichel. Machy. (N. Y.), vol. 33, no. 10, June 1927, pp. 758–760, 5 figs. Machines used for way and slide grinding; general method of setting up work; quality of work and grinding time.

GRINDING MACHINES

Double-Spindle. Badger Double-Spindle Grinder. Machy. (N. Y.), vol. 33, no. 9, May 1927, pp. 702–703, 2 figs. Used for grinding two opposite parallel surfaces of work.

Hydraulic. Hydraulic Internal-Grinding Machine. Machy. (Lond.), vol. 30, no. 761, May 12, 1927, pp. 185–186, 3 figs. Wotan-Werke A. G., Leipzig, has constructed 26-in. internal grinder with hydraulic drive to headstock as well as hydraulic traverse to grinding slide.

H

HAMMERS

Steam. Niles Double-Frame Steam Hammers. Am. Mach., vol. 66, no. 21, May 26, 1927, pp. 916–917, 1 fig. Hammer is of double-acting type, and length of stroke, position, speed, and intensity of blows are controlled either automatically or by hand by means of two levers, one controlling operating and other throttle valve.

HEAT

Reflection by Metal Surface. Reflection of Heat Ray by Metal Surface, M. Oyama and Z. Hikasa. Inst. Elec. Engrs. of Japan—Jl., no. 465, Apr. 1927, pp. 345–351, 8 figs. Investigation of reflection of heat ray by surfaces of brass, copper, and aluminum, using as heat-ray source, total radiation of nichrome heat element and thermopile as detector; reflection from rough surfaces; surfaces polished by sand paper and frosted glass were investigated. (In Japanese.)

HEAT TRANSMISSION

Boundary Layers. Heat Transfer in Boundary Layers Under Great Temperature Differences Between Wall and Fluid (Wärmeübergang in Grenzschichten bei grossen Temperatur-Unterschieden zwischen Wand und Flüssigkeit), A. Stodola. Schweizerische Bauzeitung, vol. 89, no. 20, May 14, 1927, pp. 261–262. Theoretical analysis involving higher mathematics; contains supplement to article published in issue of Apr. 9, on heat transmission with highly variable initial flow.

Building Walls. Graphic Method for Determining Heat-Transmission Coefficients Through Building Walls (Méthode graphique pour déterminer les coefficients de transmission de chaleur à travers les parois des bâtiments) R. Meisterhans. Chaleur & Industrie, vol. 8, no. 80, May 1927, pp. 269–274, 7 figs. Graphic methods which permit rapid and accurate determination of heat-transmission coefficient for any type of construction, adhering strictly to mathematical character.

Heat-Flow Measurement. A Calibrated Thermal Resistance Plate for Measuring Heat Flow, C. G. F. Zobel. Optical Soc. of Am.—Jl., vol. 14, no. 5, May 1927, pp. 409–422, 8 figs. Review of various methods considered for measuring heat flow; heat-flow meter as developed for heat-transfer measurements is described and data presented substantiating basic claims made for it; calibrating apparatus, constancy of calibration, and application of meters to actual measurements of heat flow through roof.

HEATING

Oil Circulation. Industrial Heating by Oil Circulation, A. B. McKechnie. Indus. & Eng. Chem., vol. 19, no. 6, June 1927, pp. 691–693, 2 figs. Heat transmission by hot oil embodies desirable features and eliminates objections of other methods for obtaining high temperatures; quantity of heat delivered is under control at all times, and product temperatures up to 555 deg. fahr. are reached without difficulty; design of system; applications.

HEATING, HOUSE

Gas. House Heating with Gas, R. E. Sively. Am. Gas. Jl., vol. 126, no. 22, May 28, 1927, pp. 527–531, 5 figs. Effect of temperature on amount of gas used; hourly-demand charts.

HINGES

Heavy. Heavy Hinges, A. Rutherford. Machy. (Lond.), vol. 29, no. 755, Mar. 31, 1927, pp. 849–850, 1 fig. Deals with friction of hinge bearings.

HOISTS

Brakes. Safety Hoist Brake of New Type Has Many Advantages, C. H. S. Tupholme. Coal Age, vol. 31, no. 20, May 19, 1927, pp. 729–731, 2 figs. Free-fall brake eliminates braking-pressure shocks.

Skip. New High-Power Skip Hoists in Coal Mines of Southern Illinois (Neue Kübelförderungen mit grossen Leistungen auf Schachtanlagen in Süd-Illinois), F. Herbst. Glückauf, vol. 3, no. 19, May 7, 1927, pp. 673–681, 7 figs. Review of work by A. J. Hoskin published in Bulletin of University of Illinois, Aug. 1920.

Skip Hoisting in Mining Practice (Die Kübelförderung im Bergwerkbetriebe), P. Walter. V.D.I. Zeit., vol. 71, no. 21, May 21, 1927, pp. 696–702, 32 figs. Use of skip hoists is gaining favor in German mines; details of operation and economic advantages, based on practical experiences.

HUMIDITY

Measurement. A New Hygrometer for Mines, W. Hancock. Instn. Min. Engrs.—Trans., vol. 72, part 6, Apr. 1927, pp. 336–339 and (discussion) 339–342. Special hygrometer, designed by author for personal use enables accurate hygrometric readings to be taken even in confined passages; affords actual observation of entire movement of mercury column; readings are observed in requisite velocity of 600 feet per minute.

HYDRAULIC GEARS

Variable-Speed. The "Williams-Janney" Variable Speed Gear. Power Engr., vol. 22, no. 255, June 1927, pp. 223–225, 5 figs. Improved design of hydraulic speed gear.

HYDRAULIC TURBINES

Kaplan. The Official Tests of the Kaplan Turbine at Lilla Edet, H. O. Dahl. Engineering, vol. 123, no. 3201, May 20, 1927, pp. 599–602, 9 figs. Results of official tests carried out in 1926; guarantees have been appreciably improved in regard to output and efficiency; investigation was also made regarding effect of various shapes and lengths of suction pipe on Kaplan turbine.

Sweden. Lilla Edet Station Has Two Types of Waterwheels, G. Willock. Power, vol. 65, no. 23, June 7, 1927, pp. 866–868, 9 figs. Three waterwheels of 11,200-hp. rating operate under 21-ft. head; all these wheels are of propeller type, one having adjustable blades and two stationary blades; this combination gives an efficiency of 90 per cent from about 3000 to 32,000 hp. load.

Testing. Tailrace Used to Obtain Test Load on Hydro-Electric Unit, C. R. Reid. Power, vol. 65, no. 24, June 14, 1927, p. 919, 2 figs. Method employed for tests at different speeds on 30,000-hp. waterwheel which was direct-connected to 25,000-kva. 60-cycle generator; advantages of arrangement over usual water box or rheostat directly connected to generator are that it is less expensive, more quickly installed, and more reliable in operation.

I

ICE PLANTS

Borehole Water for. Artesian Wells and Refrigeration, H. G. Benham. Ice & Cold Storage, vol. 30, no. 350, May 1927, p. 120, 2 figs. Advantages of borehole in ice and storage plant.

Diesel-Engined. Ice Plant Operation with Diesel Oil Engines, G. M. Kleucker. Ice & Refrigeration, vol. 72, no. 5, May 1927, pp. 463–468, 4 figs. Presents solution to problems in meeting keener competition confronting ice manufacturers; reducing cost of production by using engine as prime mover.

Production Costs. The Ice Industry Today, H. P. Hill. Refrig. World, vol. 62, no. 5, May 1927, pp. 9–13. Cost-production records and analysis of conditions as they exist at present in ice industry.

INDUSTRIAL MANAGEMENT

Budgeting. Improving Unit Costs Through the Budget, J. H. Barber. Mfg. Industries, vol. 13, no. 6, June 1927, pp. 447–450, 1 fig. Proposed reduction of 3.3 per cent in total cost was made up of 4.4 per cent in piece-rate labor, 5 per cent in indirect payroll; such a program controls production and assures profits.

Increasing Production. Cutting Costs on Contract Work, A. Mumper. Mfg. Industries, vol. 13, no. 6, June 1927, pp. 453–454, 1 fig. Methods of inspection; written operation instructions and bonus-wage payment have been successful in increasing production.

Inventory Control. Cost Cutting in Inventories and Accounts, L. C. Kunz. Mfg. Industries, vol. 13, no. 6, June 1927, pp. 429–432, 3 figs. Waste reduced, stocks cut down, manufacturing cost lowered and profits increased by system of inventory control and cost accounting that checks up monthly with surprising degree of accuracy; method employed by Moto-Meter Co.

Printed Forms. Planning for Better Forms, A. J. Zimmerman. Am. Mach., vol. 66, no. 22, June 2, 1927, pp. 919–920, 2 figs. Designing of forms to provide for simplicity and economy is consideration of primary importance, and has vital bearing on efficiency with which routine of business is carried on.

Purchasing. Hand-to-Mouth Buying and Its Effect on Business, H. N. McGill. Indus. Mgmt. (N. Y.), vol. 73, no. 6, June 1927, pp. 344–347, 1 fig. Discussion of relation between commodity prices and conservative purchasing.

Standard Costs. Installing Standard Costs, G. C. Harrison. Mfg. Industries, vol. 13, no. 6, June 1927, pp. 420–428, 1 fig. Shows how to eliminate most of usual detail and time involved in distributing factory burden.

Standard Instructions. Holding Labor Costs to Standard, L. A. Sylvester. Mfg. Industries, vol. 13, no. 6, June 1927, pp. 441–444, 3 figs. Shows how to make lower costs permanent by preparing instructions for everyone to follow, from superintendent to workman.

Statistical Reports. A Practical Method for Analyzing Business Conditions, J. B. Waterfield. Indus. Mgmt. (N. Y.), vol. 73, no. 6, June 1927, pp. 337–338, 2 figs. Statistical reports contain interesting information if properly studied; suggested form for keeping track of business conditions.

Taylor System. Has Taylorism Survived? D. S. Kimball. Mech. Eng., vol. 49, no. 6, June 1927, pp. 593–594. Points out that Taylor's paper, Shop Management, still remains basic statement of new industrial philosophy; many interpretations, however, have been made of this philosophy; but any one well informed concerning Taylor's pioneer work will find no difficulty in identifying some of his methods in almost any up-to-date manufacturing plant in this country; perhaps most common elements to be found are those of rate setting on basis of accurate time study, and planning and dispatching of operations on basis of prearranged time schedule.

INDUSTRIAL PLANTS

Building Maintenance. Maintenance and the Industrial Building, W. G. Ziegler. Indus. Mgmt. (N. Y.), vol. 73, no. 6, June 1927, pp. 351–354. Suggestions for keeping buildings and other plant facilities in good condition.

England. The Works of Messrs. Herbert Morris, Limited, Loughborough. Engineering, vol. 123, nos. 3192, 3194, 3200 and 3203, Mar. 18, Apr. 1, May 13 and June 3, 1927, pp. 311–314, 380–382, 572–576 and 582, and 661–664, 53 figs. partly on supp. plates. Methods and equipment of firm which specializes in plants for handling goods of all kinds from raw material to finished product, including all types of cranes and hoists, conveyors, battery trucks and battery locomotives; detailed description of various shops.

Location. Plant-Location Factors of Western Electric Co., Kearny Works, O. C. Spurling. Mech. Eng., vol. 49, no. 6, June 1927, p. 697. Advantages and disadvantages of city location; advantages of Kearny site.

Reducing Freight by Plant Location, H. S. Colburn, Mfg. Industries, vol. 13, no. 6, June 1927, pp. 437–440, 5 figs. Author indicates where plants should be located with reference to supplies of raw materials and distribution of finished goods.

Maintenance. Schedule Methods for Plant Maintenance, J. C. Somers, Mfg. Industries, vol. 13, no. 6, June 1927, pp. 451–452, 3 figs. Brings same kind of savings and cost reduction as production planning.

Planning for Future Growth. Plant Planned for Future Growth, R. A. Fiske. Iron Age, vol. 119, no. 21, May 26, 1927, pp. 1509–1512, 4 figs. Excellent example of provision for future is afforded in plans that were adopted by Chain Belt Co., Milwaukee.

Purchasing, Renting or Building. Does It Pay to Buy a Plant? M. G. Farrell. Indus. Mgmt. (N. Y.), vol. 73, no. 6, June 1927, pp. 339–343. Comparison between buying, renting and building industrial plant.

INTERNAL-COMBUSTION ENGINES

Detonation. Detonation, W. A. Whatmough. Automobile Engr., vol. 17, nos. 225, 226, 227 and 228, Feb., Mar., Apr. and May, 1927, pp. 55–58, 88–91, 146–147 and 170–173, 7 figs. Secret of "detonation" within meaning of term as applied to internal-combustion engines, lies in uneven distribution of various factors which determine chemical combustion; such combustion comprises three distinct stages; initiation, propagation, and completion of combustion; flame characteristics; liquid fuels and characteristics of combustible mixtures therefrom; engine characteristics; consideration of detonation theories. Mar.: Detonation standards; factors; components of motor fuels. Apr.: Mean volatility and mixture stability; vaporization of fuel; saturation temperatures or fog points. May: Practical considerations.

Indicator-Cards Analysis. Analyzing the Indicator Cards of Internal-Combustion Engines. Mech. Eng., vol. 49, no. 6, June 1927, pp. 616–618, 1 fig. Discussion of paper by P. H. Schweitzer published in Mid-Nov. 1926 issue of journal.

Thermodynamic Analysis of Cycles. A Thermodynamic Analysis of Internal-Combustion Engine Cycles, G. A. Goodenough and J. B. Baker. Univ. of Ill.—Bull., vol. 24, no. 21, Jan. 25, 1927, 67 pp., 24 figs. Applies accurate system of analysis to two leading cycles of internal-combustion engine, and obtains thereby accurate values for ideal efficiencies under various conditions; comparison of efficiencies obtainable for various liquid fuels.

Variable Compression. Internal-Combustion Engine with Variable Compression. Engineering, vol. 123, no. 3202, May 27, 1927, pp. 638–639, 5 figs. Designed by Ricardo & Co.; testing set was made up of complete unit with electric cradle dynamometer.

IRON

Industrial Application. Pure Iron in Its Industrial Applications, L. P. Sidney. Iron & Steel Industry & Brit. Foundryman, vol. 1, no. 2, May 6, 1927, pp. 41–43. Homogeneity and corrosion; commercially pure iron; ingot iron; importance of homogeneous base in tinning, galvanizing and enameling; reliability of homogeneous material.

IRON, PIG

Foundry. The Evaluation of Foundry Pig Iron, R. Moldenke. Am. Foundrymen's Assn.—advance paper, no. 5, for mtg. June 6–10, 1927, 6 pp. Early history of agitation for some standard method of evaluating quality of pig iron in addition to chemical analysis; need is stated to be largely caused by practice of blast furnaces operating using cast-iron scrap additions to furnace burden; discusses factors for improving quality of iron in castings by such methods as superheating.

L

LABOR

Legislation. International Labour Legislation in the Light of Economic Theory, H. Feis. Int. Labour Rev., vol. 15, no. 4, Apr. 1927, pp. 491–518. Author examines in light of classical theory, intrinsic value and possible effects of principles laid down in Part 13 of Treaty of Versailles; analysis is marked by freedom from preconceived ideas and dogmatism in any form; comparison of two seemingly contradictory opinions provides an opportunity for stocktaking of whole question, covering all its aspects and its nearer and remoter forms.

LACQUERS

Duco, for Rolling Stock. Frisco Gets Good Results with Lacquer, H. L. Worman. Ry. Mech. Engr., vol. 101, no. 6, June 1927, pp. 351–354, 6 figs. Economy of Duco applications shown by 2½ years service on both passenger cars and locomotives.

LATHES

Car-Wheel. Niles Improved No. 4 Car-Wheel Lathe. Am. Mach., vol. 66, no. 22, June 2, 1927, pp. 955–956, 1 fig. Improvements in turret toolpost construction and full-automatic driver dogs.

Multiple Tool. The "Maxicut" Multiple-Tool Lathe. Mech. World, vol. 81, no. 2108, May 27, 1927, pp. 377–378, 4 figs. Rapid-production lathe, made by Drummond Bros.

Rate-Fixing Charts. Line Charts for Rate-fixing on Lathes, Cotan. Machy. (Lond.), vol. 30, no. 756, Apr. 7, 1927, pp. 17–18, 3 figs. Presents charts which are likely to prove very useful to rate fixers generally.

Turret. Turret Lathes in Railroad Shops, A. C. Cook. Ry. Mech. Engr., vol. 101, no. 6, June 1927, pp. 345–348, 12 figs. Suitable for quantity and small-lot production; different types of machines and work turned out on them.

LIGHTING

Aerial Navigation. Artificial Light as an Aid to Aerial Navigation, H. N. Green. Illum. Engr., vol. 20, Apr. and May 1927, pp. 101–105 and 133–137 and (discussion) 137–140, 18 figs. Deals with beacons and lighting units used on airdromes; lighting of Croydon-Lympne air route; airdrome illumination.

LOCOMOTIVE BOILERS

Feedwater Heating. Tests with a Boiler-Feedwater Preheating Pump of Dabeg Type (Versuche mit einer Kesselspeisewasser-Vorwärmpumpe, Bauart "Dabeg"), J. Rihosek. Organ für die Fortschritte des Eisenbahnwesens, vol. 82, no. 7, Apr. 15, 1927, pp. 121–125, 3 figs. Dabeg Machine Works, Vienna, has built, in conjunction with machine works of State Railway Co., locomotive in which feedwater, which is raised by means of Dabeg portable pump, flows through a feedwater heater before entry into boiler; this heater consists of tubes which penetrate into fire tubes; in this way feedwater is heated to 180 or 200 deg. cent. before admission to boiler; results of tests on Dabeg pump.

High Steam Pressures. High Steam Pressures in Locomotive Cylinders, L. H. Fry. Am. Soc. Mech. Engrs.—advance paper, for mtg., May 23–26, 1927, 14 pp., 7 figs. Survey of efficiencies obtainable with various steam pressures; effect of ratio of expansion on efficiency; Rankine cycle does not offer satisfactory basis of comparison for locomotive; therefore modification is suggested, known as "locomotive cycle" and all calculations are based on this cycle; changes in boilers to permit operation of high pressures and temperatures; concludes that it is possible to secure considerable increase in thermal efficiency of cylinders by increasing boiler pressure; use of three cylinders, one operating on high pressure and two low, makes compounding very simple matter, permitting greatest return to be received from high pressures.

Scale Removal. The Best and Most Economical Method of Scaling the Inside of Boiler when Flues and Tubes Are Removed. Boiler Maker, vol. 27, no. 5, May 1927, pp. 133–134. On Northern Pacific at Brainerd, Minn., scaling hammer and tools specially designed for scaling boilers are used. Abstract of paper read before Master Boiler Makers' Assn.

LOCOMOTIVES

Diesel-Engined. Diesel Locomotives. Ry. Age, vol. 82, no. 25, May 21, 1927, pp. 1514–1515. Information regarding European locomotives; Diesel locomotives in United States. Abstract of Committee report before Am. Ry. Assn.

Sidoroff Diesel Locomotive. Vestnik of Met. Industry, no. 1–2, Jan.-Feb. 1927, pp. 30–35, 1 fig. Design of 2–4–2 eight-cylinder Diesel locomotive with pneumatic transmission and novel control of operation; locomotive has not yet been built but is being developed for 1927 competition. (In Russian.)

Economy Devices. New Locomotive Economy Devices. Ry. & Locomotive Eng., vol. 40, no. 5, May 1927, pp. 142–149, 5 figs. Steam-comsumption test; locomotive steam desaturators; controlled draft in locomotives; mechanical cut-off control. Paper read before Int. Ry. Fuel Assn.

4-8-4. C. N. R. Buys 4–8–4 Type Locomotives. Ry. Age, vol. 82, no. 27, June 4, 1927, pp. 1728–1732, 8 figs. Silicon-steel boilers carry 250 lb. pressure; main driver and truck journals have floating bushing bearings.

High-Pressure. High Pressure Locomotive for the D. & H. Boiler Maker, vol. 27, no. 5, May 1927, pp. 124–127, 2 figs. "John B. Jervis," second locomotive for this railroad with water-tube firebox, carries 400 lb. boiler pressure.

Internal-Combustion. Internal-Combustion and Storage-Battery Locomotives (Ueber Motorlokomotiven), Schulz. Glasers Annalen, vol. 99, no. 11, Dec. 1, 1926, pp. 164–169, and vol. 100, nos. 2 and 8, Jan. 15 and Apr. 15, 1927, pp. 21–24 and pp. 117–127, 35 figs. Deals with fireless Honigmann, compressed-air, storage-battery, and oil-engine locomotives, giving examples of each.

Mountain Type. The Mountain Locomotives of Europe (Las locomotoras "Montaña" en Europa), P. Aza and B. Costilla. Ingenieria y Construcción, vol. 5, no. 50, Feb. 1927, pp. 53–59. Resistance of locomotives; maximum production of steam; maximum potential; critical and maximum speed.

Pacific Type. Locomotive Performance on the Buenos Ayres Great Southern Railway. Ry. Gaz., vol. 46, no. 19, May 13, 1927, pp. 619–621, 2 figs. Remarkable achievements of new British-built 3-cylinder Pacific-type engines.

Smokebox Regulator. New Type Smokebox Regulator for Superheater Locomotives. Ry. Engr., vol. 48, no. 569, June 1927, pp. 239–240, 1 fig. Arrangement giving ready accessibility with low maintenance cost.

Superheater. 1-E 3-Cylinder Superheater Freight Locomotive, Class G12 (1-E-Dreizylinder-Heissdampf-Güterzug-Lokomotive, Gattung G12), E. Herms. Fördertechnik u. Frachtverkehr, vol. 20, no. 9, Apr. 29, 1927, pp. 165–170, 4 figs. Reasons why German State Railway decided upon this type of locomotive; performance data.

Wheel-Quartering Machine. Locomotive Wheel Quartering Machine. Machy. (Lond.), vol. 30, no. 763, May 26, 1927, p. 231, 3 figs. John Hetherington & Sons, Manchester, have constructed machine with capacity for wheels up to 6 ft. 6 in. diameter on tread, and admits axles up to 8 ft. in length between centers.

LUBRICANTS

Low-Speed Bearings. Lubricants for Low Speed Bearings, A. Seton. Machy. (Lond.), vol. 30, no. 763, May 26, 1927, pp. 250–252, 1 fig. Graphite and graphitic lubricants; metallic soaps; greases; coolers for bearings.

LUBRICATING OILS

Internal-Combustion Engines. Engine Service Tests of Internal-Combustion Engine Lubricating Oils Made from California Crude Petroleum, M. J. Gavin and G. Wade. U. S. Bur. Mines—Tech. Paper, no. 387, 57 pp., 9 figs. Engine tests to determine relative merits of Western oils that do and do not pass acidity and emulsion tests as set forth in Technical Paper 305, Bureau of Mines, for class C oils.

Production from Coal. The Production of Lubricating Oil from Coal. Engineering, vol. 123, no. 3203, June 3, 1927, pp. 665–666, 11 figs. Results of tests carried out by National Physical Laboratory on lubricating oil produced by L & N process of coal distillation.

Refining Waste Oils. Lubricating Oils (Rationelle Oelwirtschaft in industriellen Betrieben), R. A. Wischin. Chemiker-Zeitung, vol. 51, no. 19, Mar. 9, 1927, pp. 181–182. Refining of waste or spent oils as effective means of cutting down lubrication costs; particular emphasis is given to filtration with floridin; other clarifying (adsorption) agents are silica gel, fuller's earth, active carbon, etc.

LUBRICATION

Gasoline Plants. Lubrication in Natural Gasoline Plants, O. S. Wyatt, F. R. Staley and E. R. Lederer. Oil & Gas Jl., vol. 26, no. 1, May 26, 1927, pp. 103 and 135. Ordinary tests not sufficient to assure satisfactory oils for varied uses in plant operation. Paper read before Assn. of Nat. Gasoline Mfrs.

Gears. Lubrication of Power Transmission and Speed Reduction Mechanisms. Lubrication, vol. 13, no. 4, Apr. 1927, pp. 37–48, 19 figs. Gear lubrication; spur-type gears; spiral, helical or herringbone type; bevel and angular gears; annular and worm reduction gears; selection of gear lubricants; chain-drive lubrication; factors governing chain lubrication; belt and rope drives.

M

MACHINE SHOPS

Motion-Time Analysis. More Production from Motion-Time Analysis of Work, A. B. Segur. Mfg. Industries, vol. 13, no. 6, June 1927, pp. 445–446. Gives example which shows possibilities of cost cutting; motion tests for applicants.

Power Costs. Tendency in the Development of Power Cost in Machine Shops, 1924–1926 (Die Entwicklungstendenz der Energiekosten von Maschinenfabriken 1924–1926), K. Setdenhelm. Elektrischer Betrieb, vol. 25, no. 5, May 15, 1927, pp. 51–53. Supplement to article by author on development of overhead and auxiliary costs; presents tabular data on costs for electric power for one month.

MACHINE TOOLS

Automobile Industry. The Leipzig Fair. Automobile Engr., vol. 17, no. 228, May 1927, pp. 174–177, 10 figs. Machine tools of interest to automobile manufacturers.

Combination. Combination Machine Tool. Engineer, vol. 143, no. 3724, May 27, 1927, pp. 583–584, 3 figs. Machine tool was exhibited by Czechoslovakian firm, which is combination machine designed to fulfil functions of lathe, milling, shaping and drilling machines.

Cutting Off Coil Springs. Machine for Cutting Off Coil Springs, J. Fenno. Machy. (N. Y.), vol. 33, no. 9, May 1927, pp. 678–679, 1 fig. Machine for cutting off springs from coils previously wound in speed lathe with special tool.

German Exhibit at Leipzig. The German Machine-Tool Exhibit at Leipzig, J. W. Roe. Mech. Eng., vol. 49, no. 6, June 1927, pp. 703–704, 2 figs. German exhibit is part of Technical Fair held for two weeks during March in connection with general Leipzig Sample Fair; it is housed in splendid building, built at cost of 5 million marks; from technical point of view tool exhibits show skill of German mechanics and engineers.

Indexing Mechanisms. Locating the Stopping Points of a Precision Indexing Mechanism. Am. Mach., vol. 66, nos. 18 and 19, May 5 and 12, 1927, pp. 725–728 and 765–768, 13 figs. Dividing circle 18 ft. in circumference into six equal parts within limit of error of less than 0.001 in., plus or minus, is part of daily work of men who build "Mult-Au-Matics" at plant of Bullard Machine Tool Co., Bridgeport, Conn. May 12: Locating positions of carrier having been established they are corrected by means of precision instruments.

Maintenance. The Economics of Machine Tool Maintenance, W. Ichler. Ry. Mech. Engr., vol. 101, no. 6, June 1927, pp. 331–334, 4 figs. Individual machine-tool repair cost and service records an accurate guide in determining repair or replacement policies.

Materials for. Selection of Materials. Times Trade & Eng. Supp., vol. 20, no. 463, May 21, 1927, p. 231. Deals with metals for beds, frames and columns; spindles and bearings; gears and chucks.

Paris Fair. Machine Tools for Metal Working (Les machines-outils pour le travail des métaux), Technique Moderne, vol. 19, no. 10, May 15, 1927, pp. 297–306, 30 figs. Review of different types of machine tools exhibited at fair at Paris, May 1927, by French, German and American firms; intensive production due to new alloys for manufacture of tools.

Progress. Machine Tool Progress in the Twentieth Century, J. E. Gleason. Am. Mach., vol. 66, no. 21, May 26, 1927, pp. 885–886. Extracts from president's address to Nat. Machine Tool Builders' Assn.

Stretchers. Stretcher Used for Body Panels. Iron Age, vol. 119, no. 17, Apr. 28, 1927, pp. 1221–1222, 2 figs. Over 7000 panels stretched a month in Chicago Automotive Plant; economies claimed for process.

MACHINERY

Specific Speed. Laws of Sizes and Specific Speeds of Machines (Wachstumsgesetze und spezifische Drehzahlen der Maschinen), W. Kummer. Schweizerische Bauzeitung, vol. 89, no. 16, Apr. 16, 1927, pp. 207–211, 7 figs. A study of relation: (capacity by specific speed = constant), in its application to motors, turbines, conveyors, scrapers, bucket elevators, etc.

MAGNETOS

High-Tension. The High Tension Magneto, A. P. Young and L. Griffiths. Automobile Engr., vol. 17, no. 228, May 1927, pp. 188–194, 14 figs. High-tension magneto; post-war developments; trend of design to meet post-war conditions; rotating-armature magneto; polar-inductor magneto; rotating-magnet magneto; simplification of design and operation; contact materials; magnet steels; insulating materials used in condensers; dual systems of ignition.

MALLEABLE CASTINGS

Specifications. Report of Committee A-7 on Malleable Castings, W. P. Putnam. Am. Soc. Testing Materials—advance paper, no. 14, for mtg. June 20–24, 1927, 1 p.

MALLEABLE IRON

Oil-Fired Furnace for. Experiences with Oil-Fired Reverberatory Furnace in Malleable Casting (Betriebserfahrungen mit dem Oelflammofen in der Tempergiesserei), A. Zankl. Giesserei-Zeit., vol. 24, no. 2, Jan. 15, 1927, pp. 35–38. Design of furnace and its use as mixer; temperature of exhaust gases and additional air; use of furnace for melting; oil consumption and operating results; advantages of this type of furnace.

Properties. Malleable Iron (La Malléable), M. Leroyer. Fonderie Moderne, vol. 21, May 10, 1927, pp. 101–111, 6 figs. Historical review dealing with European and American malleable; constituents of alloys FeC; theory of graphitization; influence of elements, temperature and time on graphitization; action of CO_2 and of CO on graphitization.

MATERIALS HANDLING

Industrial Plants. Monroe Calculating Machine Company Makes Large Savings in Handling, C. R. Britten. Mfg. Industries, vol. 13, no. 6, June 1927, pp. 411–414, 8 figs. Methods and equipment employed.

Loaders. The "Dygyloader." Indus. Mgmt. (Lond.), vol. 14, no. 5, May 1927, pp. 157–158, 3 figs. Details of portable loading device, of bucket-elevator type,

which is on Fordson tractor; suitable for digging sand, gravel, coal, coke and crushed stone in smaller sizes.

MEASUREMENTS

Factories. Measurement and Management, W. F. Watson. Indus. Mgmt. (Lond.), vol. 14, no. 5, May 1927, pp. 175–176. Views on system of measurement prevailing in many works; points out complexities of English system of measurement; peculiarities of threads; first essential is to establish definite and immutable standard of measurement which all manufacturers should be compelled to adopt.

MEASURING INSTRUMENTS

Comtor. Comtor Measuring and Inspecting Instruments. Machy. (N. Y.), vol. 33, no. 9, May 1927, pp. 699–700, 5 figs. Development of inspection system to meet needs of quantity-production manufacture of interchangeable parts; all instruments of system are of such design that gaging or contact surfaces are automatically applied to reference standard and to work by uniform spring pressure.

Power Plants. Measuring with the Barometer and Manometer, S. A. Curry. Power Plant Eng., vol. 31, no. 11, June 1, 1927, pp. 636–638, 2 figs. Manipulation of instruments, principle of capillarity, formation of meniscus and necessary precautions.

MECHANISMS

Backlash Eliminator. Backlash Eliminator. Am. Mach., vol. 66, no. 22, June 2, 1927, pp. 921–924, 9 figs. Bethlehem lashlock is mechanical device that is vital to functioning of Bethlehem torque amplifier and has many other applications.

Rapid-Reversing. Quick-Reversing Mechanism for Wire Coiling, P. Gates. Machy. (N. Y.), vol. 33, no. 10, June 1927, pp. 735–736. Embodied in machine for winding coils having number of layers one upon other, as used in electrical trade.

MERCURY-VAPOR PROCESS

Hartford, Conn., Plant. The Mercury Vapor Power Plant at Hartford. Power, vol. 65, no. 22, May 31, 1927, pp. 818–819, 2 figs. Equipment comprises mercury boiler, fired with pulverized coal, mercury-vapor superheater, mercury economizer, combustion-air preheater, mercury-vapor turbine, heat exchanger that is at once mercury condenser and steam boiler, and steam superheater through which steam passes to steam plant in connection with which this mercury unit operates.

METAL WORKING

Shearing. What Happens in Shearing Metal, E. V. Crane. Machy. (N. Y.), vol. 33, no. 9, May 1927, pp. 641–647, 16 figs. Analysis of action of metal in shearing, blanking or punching; factors affecting pressures required and results obtained.

Stampings. Designing Stampings or Die-made Parts, J. K. Olsen. Machy. (N. Y.), vol. 33, no. 9, May 1927, pp. 681–684, 7 figs. Direction of grain stock; length of material for forming lugs; hub embossing and clinched lug fastenings.

METALS

Extrusion. Metal Extrusion Presses. Mech. World, vol. 81, no. 2107, May 20, 1927, pp. 353–354, 1 fig. Method of operating extrusion presses; type of press commonly used for extruding brass, copper and bronze; inverted process.

MICROMETERS

Accuracy. Micrometer Accuracy, H.T.U.R. Indus. Mgmt. (Lond.), vol. 14, no. 5, May 1927, pp. 187–188. Inaccuracy of micrometers is due to faulty pitch of screw; setting micrometers.

MILLING

Practice. Some Considerations on the Practice of Milling, A. N. Goddard. South. & Southwest. Ry. Club—Proc., vol. 19, no. 2, Mar. 1927, pp. 9–10, 13–14, 17–18, 21–22, 25–26, 29–30, 33–34 and 37, 4 figs. Discusses basic principles of milling; efficiency of finishing surfaces by milling and planing.

MILLING MACHINES

Arbors. Manufacturing Milling Machine Arbors, F. B. Heitkamp. Machy. (N. Y.), vol. 33, no. 9, May 1927, pp. 665–672, 17 figs. Methods and equipment used in making standard milling-machine arbors on production basis in specialized department.

Connecting Rods. Bement 58-Inch Extra-Heavy Rod Milling Machine. Am. Mach., vol. 66, no. 22, June 2, 1927, pp. 949–950, 2 figs. Six connection rods can be handled on edge, or two flat for slabbing or channeling operations.

Cotter and Keyseat. Niles No. 3 Cotter and Keyseat Miller. Am. Mach., vol. 66, no. 21, May 26, 1927, pp. 911–912, 1 fig. For finishing cotter ways and keyseats in locomotive crossheads, piston rods and axles.

MOLDING METHODS

Loam. Loam Molding (Die Lehmformerei), A. Geissel. Giesserei-Zeit., vol. 24, no. 2, Jan. 15, 1927, pp. 29–34, 17 figs. Points out advantages of loam molding; properties and preparation of loam; proper molding methods and systematic distribution of work; gives numerous examples.

Losses, Reduction of. The Reduction of Molding Losses, R. A. Greene. Am. Foundrymen's Assn.—advance paper, no. 9, for mtg. June 6–10, 1927, 11 pp., 3 figs. Problem of what can be done to get closer union or coöperation between molders, instructors, foremen, metallurgists, engineers and other groups with main idea of producing quality castings with low loss; plan put into practice at Ohio Brass Co.'s works; accurate records are nucleus of system and publicity creating interest and attracting attention to these records is important follow-up point; by means of this system losses have been cut from yearly average of $8^1/_2$ to $4^1/_2$ per cent, which in their plant means saving of some 200,000 lb. of castings.

MOLDS

Chaplets. Cast Chaplets and Tinned and Untinned Core Irons, J. Varlet. Am. Foundrymen's Assn.—advance paper, no. 19, for mtg. June 6–10, 1927, 11 pp., 10 figs. Tests show that cast-iron chaplets must be adapted to character of castings; their thinness or thickness, volume of metal to be poured into mold, rapid or slow flow of metal in contact with chaplets, volume and weight to be supported, etc.; chaplets of very mild and high-phosphorus cast iron will not stand very long continuous flow of metal, at temperature of 2100 deg. fahr., for example.

Drying. A New Type of Mold Drying Oven, G. H. Wright and J. M. Sampson. Am. Foundrymen's Assn.—advance paper, no. 13, for mtg., June 6–10, 1927, 9 pp., 7 figs. Car-type mold-drying oven in steel foundry of General Electric Co. at Schenectady; when steam heat is first turned on and blowers started, steam is injected into oven until temperature of center of molds reaches 180 deg. fahr.; summary of tests.

Permanent. The Holley Permanent Mould Process. Foundry Trade Jl., vol. 35, no. 559, May 5, 1927, pp. 381–382 and (discussion) 382–384. Review of J. W. Hinchley's paper on permanent molding machines for cast iron, in which he described plant used by Holley Carburetor Co. of Detroit, for making of small castings of cast iron in permanent molds mounted on rotating platform.

Thicknessing. Thicknessing Moulds to Produce Cylinder Castings, B. Shaw and J. Edgar. Foundry Trade Jl., vol. 35, no. 560, May 12, 1927, pp. 404–405, 7 figs. Principle of thicknessing in its application to molds swept about a vertical spindle.

MOTOR BUSES

Germany. Progress in Germany, W. F. Bradley. Motor Transport, vol. 44, no. 1159, May 30, 1927, pp. 639–644, 9 figs. As revealed by latest types of passenger and freight-carrying vehicles seen at Cologne exhibition.

MOTOR-TRUCK TRANSPORTATION

Inter-Factory. Inter-Factory Transport, W. F. Bradley. Motor Transport, vol. 44, no. 1157, May 16, 1927, pp. 573–576. How tractors and trailers and standardized container system are used for conveyance of parts and materials in and between Citroen Factories in Paris.

MOTOR TRUCKS

Electric. Electric Motor Trucks (Les chariots de transport électriques), V. Neveux. Génie Civil, vol. 90, no. 9, Feb. 26, 1927, pp. 213–216, 9 figs. Describes different types of electric trucks, including those with stationary platform, lifts trucks and tractor-trailer trucks.

French Types. Motor Vehicles at the Paris Fair, W. F. Bradley. Motor Transport, vol. 44, no. 1158, May 23, 1927, pp. 613–614. General tendencies in French design and equipment indicated by commercial-vehicle exhibits; new chassis by Renault and Somua.

N

NOZZLES

Flat Plate, Reaction on. The Reaction of a Nozzle on a Flat Plate, C. Boehnlein. Mech. Eng., vol. 49, no. 6, June 1927, pp. 671–677, 11 figs. Static and dynamic reactions of jet; effect of position of plate on discharge of nozzle; distance plate must be from nozzle to give full discharge.

NUTS

Height of. Tests with Nuts 80 Per Cent High (Versuche mit 0,8 d hohen Muttern), K. Schimz. Dinglers polytechnisches Jl., vol. 341, no. 23, Dec. 1926, pp. 263–266, 8 figs. Tests to ascertain whether nuts only 80 per cent high would be shaken off by vibrations or would give in tension tests before bolt itself; result showed that nuts were neither shaken off nor broken before bolt; with regard to tensile strength nut height could be less than 80 per cent of bolt diameter.

O

OIL

Production from Coal. The Production of Liquid Fuels from Coal, J. G. King. Chem. & Industry, vol. 46, no. 20, 1927, pp. 181T–186T. Discusses low-temperature carbonization; hydrogenation; catalytic reduction of CO.

OIL ENGINES

Airless-Injection. A 1000 B.H.P. Airless Injection Marine Oil Engine. Engineer, vol. 143, nos. 3722 and 3723, May 13 and May 20, 1927, pp. 528–529 and 544–547, 9 figs. Main features of V.M. type Deutz 6-cylinder engine and account of comprehensive tests made by Professor Langer on this engine.

Cost Prediction. Predicting Oil-Engine Costs, M. J. Reed. Power, vol. 65, no. 22, May 31, 1927, pp. 845–848, 5 figs. Use of charts enables prospective costs to be calculated; fuel costs and assumed overhead charges most important; influence of wages and repairs on total costs.

Large Marine. The Large Marine Oil Engine: Has It Overstepped Itself? Mar. Engr. & Motorship Bldr., vol. 50, no. 598, June 1927, pp. 207–208. Discusses articles written on same subject by H. H. Blache, W. S. Burn and D. M. Shannon.

Marine. Marine Oil-Engine Trials Committee. —Fifth Report. Instn. Mech. Engrs.—Proc., no. 5, 1926, pp. 1059–1128 and (discussion) 1129–1171, 37 figs. Trials of T.S.M.V. "Cape York," propelled by Hawthorn Leslie-Werkspoor, 4-stroke cycle, single-acting oil-engines with blast air-fuel injection.

Oil Jets. Experiments on Oil Jets and Their Ignition, A. L. Bird. Instn. Mech. Engrs.—Proc. no. 5, 1926, pp. 955–986 and (discussion) 986–995, 18 figs. Author has constructed vessel in which most of experiment can be carried out and in which it is also possible to see what is going on during injection and subsequent combustion; particular form of jet nozzle has also been used which is easily made to any size or shape and measured in very small sizes where difficulties are usually met with in drilling and measuring; using various sizes of these jets in conjunction with timed injection valve; comparison of behavior of jets in open air and at various densities and temperatures in vessel up to those necessary to obtain rapid spontaneous ignition has been made.

Oil Sprays. The Study of Oil Sprays for Fuel Injection Engines by Means of High-Speed Motion Pictures, E. G. Beardsley. Am. Soc. Mech. Engrs. —advance paper, for mtg., May 23–26, 1927, 16 pp., 11 figs. Apparatus for recording photographically start, growth and cut-off of oil sprays from injection valves has been developed at Laboratory of National Advisory Committee for Aeronautics at Langley Field, Va.; apparatus consists of high-tension transformer by means of which bank of condensers is charged to high voltage; controlled discharge of these condensers in sequence, at rate of several thousand per second, produces electric sparks of sufficient intensity to illuminate moving spray for photographing it; results give effects of injection pressure, chamber pressure, specific gravity of fuel oil used, and injection valve design, upon spray characteristics.

Scott-Still. A New Scott-Still Marine Engine. Shipbldg. & Shipg. Rec., vol. 29, no. 21, May 26, 1927, pp. 604–607, 6 figs. Details of 2500-b.hp. engines by Scott's Shipbuilding & Engineering Co.; single-acting oil-engine cylinders and separate double-acting steam cylinders; water-cooled pistons; mechanically operated steam valves. See also Mar. Engr. & Motorship Bldr., vol. 50, no. 598, June 1927, pp. 209–212, 6 figs.

OIL FUEL

Hahn-Eggers Refining Process. A New Method of Improving the Economy of Oil-Burning and Oil-Engined Ships (Ein neues Verfahren zur wirtschaftlichen Verbesserung des Oelfeuerungs und Oelmotorbetriebes auf Schiffen (System "Hahn-Eggers") Schiffbau, vol. 28, no. 9, May 4, 1927, pp. 215–216. Method introduced by Hahn enables residue to be converted into oil of satisfactory combustible properties, and hence makes possible commercial liquefaction or distillation of coal, also makes possible improvement of all boiler and fuel oils used in marine propulsion; process applied to boiler oils is known as Hahn-Eggers, and is based upon recognition that for more perfect combustion, these oils require chemical reconstruction, involving thermal decomposition, oxidation, and hydrogenizing. See translated abstract in Mar. Engr. & Motorship Bldr., vol. 50, no. 598, June 1927, p. 238.

OIL SHALES

Carbonization. Low Temperature Carbonisation of Nevada Shales, D. Brownlie. Gas Engr., vol. 43, no. 613, May 1927, pp. 112–113, 2 figs. Describes Catlin large-scale commercial experimental plant which has been in commercial operation for number of years; Catlin retort is vertical, mechanically continuous unit of simple cylindrical shape, in which is burned at bottom, with aid of carefully regulated air blast diluted with inert gases, part of charge, installation at Elko consisting of two retorts.

OPEN-HEARTH FURNACES

Developments. Open Hearth Furnace, Past and Present, C. S. Nugent. Blast Furnace & Steel Plant, vol. 15, no. 5, May 1927, pp. 225–226. Practical furnace operator reviews development to present day; manner of constructing modern furnace; operating features.

OXYACETYLENE WELDING

Chemical Plants. Oxy-Acetylene Welding in Chemical Plant Construction, G. O. Carter and W. B. Miller. Indus. & Eng. Chem., vol. 19, no. 6, June 1927, pp. 695–697, 4 figs. Study of construction materials necessary; welding operation; advantages of welded joints.

Steam Pipe Lines. Gas Welding Versus Flange Joints for Steam Lines. G. O. Carter. Power, vol. 65, no. 22, May 31, 1927, pp. 823–824. Arguments for replacement of flange joints by welding; ability to stand thrust and pull of pipe bends; taking care of expansion and contraction; importance of procedure control; insulation problem; saving money on tunnel lines; demand for flangeless valves and fittings.

P

PATTERNMAKING

Dowel Pins. Pattern Dowel Pins, B. Shaw. Foundry Trade Jl., vol. 35, no. 561, May 19, 1927, pp. 411–412, 4 figs. Turned or planed pin has retained its place in many pattern shops; they are very

handy for delicate ribs inside core box, or even for very small work; iron dowel plates advocated.

PIPE, CAST-IRON

Bronze-Welded. Controlling Stains in Cast Iron Pipe Lines. Oxy-Acetylene Tips, vol. 5, no. 11, June 1927, pp. 204–206, 4 figs. Importance of correct procedure in laying bronze-welded lines emphasized by engineering investigation.

PLOWS

Steam-Driven. Powerful Steam Cultivating Machinery for Italy. Engineer, vol. 143, no. 3724, May 27, 1927, pp. 581–582, 3 figs. Details of machinery on cable system, designed by J. Fowler & Co., Leeds, England.

POWER TRANSMISSION

Equipment. Transmission Parts—Oiling (Les organes de transmission—le graissage). Technique Moderne, vol. 19, no. 10, May 15, 1927, pp. 293–296, 10 figs. Deals with bearings, clutches, and coupling shafts; tendency in France towards standardization of these transmission parts; circulating oiling system; elastic coupling; applications of ball and roller bearings; lubrication; purification of used oils; belts and chains.

PRESSURE VESSELS

Heads. The Design of Dished and Flanged Pressure Vessel Heads, A. B. Kinzel. Mech. Eng., vol. 49, no. 6, June 1927, pp. 625–628 and (discussion) 636–644, 9 figs. Author presents what are believed to be rational methods of design of heads, considering stresses in all parts of heads concave to pressure; experiments and calculations both in Europe and America show that present method of designing pressure-vessel heads is subject to improvement; design described, namely, ellipsoidal head with ratio of axes of 2 to 1, is much more satisfactory; manhole flange symmetrically placed and calculated as hollow cylinder is also much more satisfactory.

Strains in Dished Heads, E. Höhn. Mech. Eng., vol. 49, no. 6, June 1927, pp. 632–635, 9 figs. Through number of independent experiments best form for dished heads was determined; from values of measured stress conditions on outside, strain conditions on inside are calculated. Translated from V.D.I. Zeit., vol. 69, no. 6, Feb. 7, 1925, pp. 155–158.

PRESSWORK

Handling Sheet Steel. Vaccum System for Handling Sheet Steel in Press Work, P. J. Edmonds. Am. Mach., vol. 66, no. 23, June 9, 1927, pp. 984–985, 3 figs. Vacuum system in operation in metal-stamping department of Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa., provides economical and effective means of handling sheet steel for blanking laminations for electrical apparatus.

PRODUCER GAS

Flame Temperature. Flame Temperature of Producer Gas with Air and Gas Preheating (Die Verbrennungstemperaturen des Generatorgases bei Luft- und Gasvorwärmung), R. Nitzschmann. Chemiker-Zeitung, vol. 51, no. 21, Mar. 16, 1927, pp. 197–198. Presents equations based upon composition of producer gas, volume of oxygen available for combustion, and temperatures of oxygen or air and producer gas; these are reduced to three constants, expressed in terms of volumes of nitrogen and oxygen present before combustion, of CO_2 and water vapor after combustion, and of specific heats and calorific values of reacting gases; combination of these constants gives theoretical flame temperature; diagram for determining flame temperature of producer gas of given composition when there is no preheating.

PULVERIZED COAL

Boiler Design. Powdered Coal and Its Influence on Modern Boiler Design, E. Kilburn Scott. Eng. & Boiler House Rev., vol. 40, no. 11, May 1927, pp. 576–578. Coal and steam dryer; coal feeders; burners. Extracts from paper read before Cleveland Inst. of Engrs.

Boiler Firing. The Calculation of Pulverized-Coal Furnaces (Beiträge zur Berechnung der Kohlenstaubfeuerungen), W. Gumz. Feuerungstechnik, vol. 15, nos. 14, 15, 16 and 17, Apr. 15, May 1, May 15 and June 1, 1927, pp. 157–160, 172–174, 184–186 and 197–199, 11 figs. Principle of combustion chamber cooled on all sides; construction of nozzle furnace; heating efficiency of pulverized-coal flame; ignition and combustion of pulverized coal; radiation of luminous flames; length of flame and temperature; Orrok radiation formula; measurements of combustion chamber; upper and lower limit of chamber; influence of time required for combustion; gas radiation.

PUMPS

Air-Lift. The Air Lift Pump Made Simple, Wm. V. Fitzgerald. Power, vol. 65, no. 21, May 24, 1927, pp. 776–778, 3 figs. Some think of air lift in terms of difference in density of two columns of fluid, one being solid water and other mixture of water and air bubbles; others explain action as that of succession of water pistons separated by units of expanding air; writer believes second theory to be more accurate and develops it in way that is easily followed.

Ancient Types. The Romance of the Water Pump. Water Wks. Eng., vol. 80, no. 12, June 8, 1927, pp. 785–786 and 873, 9 figs. Ancient communities designed pumps to aid in irrigation work and to remove water from mines; stages in progress.

PUMPS, CENTRIFUGAL

Single-Stage. Worthington Single Stage Centrifugal Pump, J. B. Lincoln. Am. Soc. Nav. Engrs.—Jl., vol. 39, no. 2, May 1927, pp. 305–314, 8 figs. partly on supp. plates. Results of tests of turbine-driven single-stage double-suction pump designed for boiler feeding at 600 lb. per sq. in. with rated capacity of 650 gal. per min.

R

RAILWAY MOTOR CARS

Diesel-Engined. Diesel Cars Reduce Operating Costs on C. N. R. Ry. Age, vol. 82, no. 27, June 4, 1927, pp. 1739–1742, 3 figs. After year's service road is building five additional units of modified design.

Gasoline. New Petrol-Driven Rail Motor Cars for Spain. Ry. Engr., vol. 48, no. 569, June 1927, pp. 234–236, 2 figs. Interesting features incorporated in design of 105-hp. Simplex cars.

RAILWAY REPAIR SHOPS

Locomotive. L. A. & S. L. Heavy Repairs Centralized at Los Angeles. Ry. Mech. Engr., vol. 101, no. 6, June 1927, pp. 323–329, 10 figs. Union Pacific shops in Southern California, notable for equipment, orderliness, good workmanship and high employee morale.

Pipe Work. Pipe Work in a Railroad Shop, S. A. Hand. Am. Mach., vol. 66, no. 21, May 26, 1927, pp. 887–888, 4 figs. Bending plate is equipped to handle pipe of all sizes; bends are drawn to shape by an electrically operated winch; universal machine for flanging pipe.

Remodeling. Remodeled Railroad Shop Meets Present Need, F. W. Curtis. Am. Mach., vol. 66, no. 24, June 16, 1927, pp. 1001–1003, 6 figs. By removal of belting and shafts, and equipping all machines with individual motor drives, an old western railroad shop has been given appearance of up-to-date plant.

RAILWAY SHOPS

Labor-Saving Devices. Time Saving Devices in a Texas Railroad Shop, F. W. Curtis. Am. Mach., vol. 66, no. 23, June 9, 1927, pp. 977–979, 10 figs. Machining crosshead guides; gage for centering tires cutting teeth in quadrants; planing fixture for shoes and wedges; shearing attachment for spring bander.

REFRACTORIES

Boiler-Furnace. Service Factors Governing the Slagging of Boiler-Furnace Refractories, R. A. Sherman. Mech. Eng., vol. 49, no. 7, July 1927, pp. 735–741, 11 figs. Progress Report of the A.S.M.E. special research committee on boiler-furnace refractories.

Specifications. Report of Committee C-8 on Refractories. Am. Soc. Testing Matls.—advance paper, no. 48, for mtg., June 20–24, 24 pp. Proposed tentative specifications for clay firebrick for malleable furnaces with removable bungs and for annealing ovens and for stationary boiler service and marine-boiler service; proposed tentative definitions of terms relating to refractories.

REFRIGERATING MACHINES

Atmospheric Condensers. Atmospheric Condensers (Der Berieselungsverflüssiger), F. Merkel. Zeit. für die gesamte Kälte-Industrie, vol. 34, nos. 2 and 3, Feb. and Mar. 1927, pp. 24–28 and 47–54, 7 figs. Deals with behavior of open condensers which depends primarily on evaporation; theory of evaporation; application of condensers.

CO_2 Compressors. Application of Direct-Connected Synchronous Motors to Carbon Dioxide Compressors, D. W. McLenegan. Power, vol. 65, no. 21, May 24, 1927, pp. 782–783, 2 figs. Abstract of paper read before Nat. Assn. of Practical Refrig. Engrs.

Electrolux. The Electrolux Refrigerator. Engineering, vol. 123, no. 3200, May 13, 1927, pp. 579–580, 3 figs. Improvements made in design by inventors, Baltzar de Platen and C. G. Munters, Stockholm, with object of increasing efficiency.

High-Speed Compressors. High Speed Refrigerating Compressors, J. C. Goosman. Power Plant Eng., vol. 31, no. 11, June 1, 1927, pp. 641–642. Europe's slender resources compared to those of United States responsible for development of high-speed compressors.

Household. Comparative Tests of Household Refrigerating Machines, G. B. Bright. Refrig. Eng., vol. 13, no. 11, May 1927, pp. 323–325 and 350, 4 figs. Shows comparative results of operation of several different types of household machines, each one operating on several different types of refrigerators.

REFRIGERATION

Atomized. The Atomised Brine Freezing Process. Ice & Cold Storage, vol. 30, no. 350, May 1927, pp. 113–114, 3 figs. Atomized brine process; cheap method of rapid freezing of different products, which, it is claimed, avoids disadvantages of all existing methods; invented by M. T. Zarotschenzeff, Reval, Esthonia.

ROLLING MILLS

Blooming Mills. The Design of 3-High Blooming-Mills Taking Utilization of Rolls into Consideration (Die Kalibrierung der Vorwalztrios unter Berücksichtigung guter Walzenausnutzung), H. Cramer. Stahl u. Eisen, vol. 47, no. 18, May 5, 1927, pp. 737–742, 9 figs. Discusses possibility of better utilization of rolls on a 3-high blooming mill.

Cold Strip Rolling. Cold-Rolled Strip Steel, T. Swinden and G. R. Bolsover. Iron & Coal Trades Rev., vol. 114, no. 2088, May 6, 1927, pp. 724–727, 18 figs. Effect of progressive cold rolling on steels of different composition, and on steels of similar composition, but in different conditions as regards heat treatment prior to cold rolling; effect of heat treatment on some of above steels after they had received varying amounts of cold rolling. Abstract of paper read before Iron & Steel Inst.

Mannesmann Tube. Mannesmann Process (Das Schrägwalzen), F. Kochs. Stahl u. Eisen, vol. 47, no. 11, Mar. 17, 1927, pp. 433–446, 30 figs. Explains formation of central hole or fissure in billet or block as it passes through mill; author ascribes this to fact that at certain stage in its passage through tapered skew rolls, block of steel assumes elliptical cross section, axis of ellipse rotating through steel as it is pushed forward and turned around by rolls; another feature is rotation of billet and twisting or torsion which it undergoes in consequence of fact that it is, at same time in contact with two rolls of widely varying diameters; experimental study of process made by arresting rolls as quickly as possible while billet is passing through them and thus obtaining specimen billets in various stages of operation. See also translated abstract in Metallurgist (supp. to Engineer), May 27, 1927, pp. 68–69.

Plate. Celebrates Its 137th Year by Installing New Four-High Plate Mill, E. C. Kreutzberg. Iron Trade Rev., vol. 80, no. 23, June 9, 1927, pp. 1475–1477, 2 figs. Lukens Steel Co. places in operation new 84-in. reversing plate mill at its plant at Coatesville, Pa. See also description in Blast Furnace & Steel Plant, vol. 15, no. 6, June 1927, pp. 280–281, 3 figs.

Strip Mills. Laclede Hot Rolled Strip Mill. Iron Age, vol. 119, no. 21, May 26, 1927, pp. 1525–1527, 4 figs. Electrical features of new plant at Alton, Ill., for producing strips up to 12 in. in width and down to 0.035 in. in thickness.

Roll Thin Strip Steel on 4-High Mill, F. B. Pletcher. Iron Trade Rev., vol. 80, no. 21, May 26, 1927, pp. 1329–1331, 3 figs. Second four-high strip mill, placed in operation in St. Louis district.

Wire-and-Rod. Sparrows Point Wire and Rod Mill, G. A. Richardson. Iron Age, vol. 119, no. 18, May 5, 1927, pp. 1291–1297, 5 figs. Methods and equipments employed at mill of Maryland plant of Bethlehem Steel Co.; straight-line layout 1525 ft. long provides continuous flow of materials; rod mill has 17 stands. See also description in Am. Metal Market, vol. 34, no. 118, June 1927, pp. 13 and 15–17, 8 figs.

ROLLS

Thermit Repair Welding. Repairing Mill Rolls with Thermit. Iron Trade Rev., vol. 80, no. 24, June 16, 1927, pp. 1536–1537, 3 figs. Easy method described for building up worn wabbler ends; how molds are made and placed.

RUBBER

Compounding. Rubber Compounding, W. Norris. India Rubber World, vol. 76, no. 3, June 1, 1927, pp. 127–128. Rubber scrap sources; regulation of reclaim grades; type reclaims; selection in compounding; weight and volume data; reclaim compounds; current practice.

S

SAFETY

Campaign. "Make April Safe" Was Philadelphia's Slogan. Elec. Ry. Jl., vol. 69, no. 19, May 7, 1927, pp. 806–812, 13 figs. Under genial sponsorship of "Will Livelong," safety sage, an intensive month-long campaign was carried on to reduce street accidents.

SAND, MOLDING

Grading. A Tentative Standard Method for Grading Foundry Sands. West. Machy. World, vol. 18, no. 5, May 1927, pp. 221–222. Fineness test; grain-fineness number; grain-fineness classification; clay-content classification.

Physical Investigation. Results of Physical Investigation of Molding and Core Sand (Ergebnisse physikalischer Form- und Kernsand-Untersuchungsmethoden), H. Reininger. Giesserei-Zeit., vol. 24, no. 8, Apr. 15, 1927, pp. 204–206, 3 figs. Points out importance of physical in comparison with chemical investigations, and describes three simple methods according to which author investigated ten different species of sand; experimental results presented in tabular form.

Rhenish Westphalian. Microscopic Investigation of Some Important Rhenish Westphalian Molding Sands for Iron, Steel, Malleable and Non-Ferrous Castings (Mikroskopische Untersuchung einiger wichtiger rheinisch-westfälischer Formsande für Eisen-, Stahl-, Temper- und Metallgiessereien sowie von Altsand einer Stahlgiesserei), L. Treuheit. Giesserei-Zeit., vol. 24, nos. 4 and 5, Feb. 15 and Mar. 1, 1927, pp. 90–97 and 125–131, 39 figs. Points out importance of microscopic investigation; investigation of core, molding and used sand; importance of glauconite as binder, as well as for color of molding sand.

Routine Control. Routine Sand Control in the Pipe Foundry, M. Kuniansky. Am. Foundrymen's Assn.—advance paper, no. 7, for mtg. June 6–10, 1927, 6 pp. Sand-control tests undertaken in pipe shops casting large iron pipe; comparison of properties of sands used in 15 different pipe shops revealed wide differences in permeability, dry and green strengths and moisture contents; explanations as to why these differences existed.

Steel Castings. Characteristics of Some Steel Molding and Core Sand Materials, E. R. Young. Am. Foundrymen's Assn.—advance paper, no. 18, for mtg. June 6–10, 1927, 12 pp. Survey of common materials, their behavior described in shop terms.

Synthetic. Synthetic Moulding Sands in the Malleable Foundry, F. C. Schieber. Am. Foundry-

men's Assn.—advance paper, no. 21, for mtg. June 6-10, 1927, 6 pp. Writer has come to conclusion that all molding sand should be treated before being used; in its natural state it is saturated with foreign matter and flame-producing elements which if not removed before molding will cause blows, washes, cracks, rough spots, cuts, scabs, blisters, excess shrinkage and prevent free escape of gases.

SCREW THREADS

Pitch-Measuring Machine. Screw-Thread Pitch Measuring Machine. Machy. (N. Y.), vol. 33, no. 9, May 1927, pp. 710-711, 2 figs. Apparatus brought out by Société Genevoise d'Instruments de Physique, Geneva, Switzerland.

SHAFTS

Torsion. The Prandtl Nadai Torsion Theories and Their Applications. Engineering, vol. 123, no. 3206, June 24, 1927, p. 771, 3 figs. Dadswell has worked out at University College large number of cases of plastic stress development in shafts.

SHAPERS

Draw-Cut. Morton Railroad Draw-Cut Shaper. Ry. Mech. Engr., vol. 101, no. 6, June 1927, pp. 376-377, 4 figs. Redesigned, heavy-duty, shaper especially adapted for railroad work.

SHEET METAL

Assembling. Thickness of Assembled Sheets, J. K. Olsen. Machy. (N. Y.), vol. 33, no. 10, June 1927, pp. 755-757, 2 figs. Variations in total thicknesses of number of assembled sheets and method of determining proper length of screws, rivets, or bushings.

SILK

Thread Manufacture. Silk Thread Engineering, W. P. Seem. Textile World, vol. 71, no. 21, May 21, 1927, pp. 101 and 105, 3 figs. Classifying, measuring and disposing of raw silk; silks separated according to color; measuring strength and strength standards; elongation and results of studies of elongation in single and multiple threads.

SMOKE

Abatement. Discussion of Papers Presented At Session on Smoke Abatement. Mech. Eng., vol. 49, no. 6, June 1927, pp. 657-662. Discussion of paper by O. P. Hood, W. C. White and Osborn Monnett, two of which were published in Mid-Nov. issue of Journal and one by W. C. White in this issue.

The Law Relating to Smoke Abatement, J. L. Turner. Surveyor (Lond.), vol. 71, no. 1843, May 20, 1927, pp. 517-518. British statutory provisions.

Boiler. Boiler Smoke and Its Prevention, C. F. Wade. Power Engr., vol. 22, no. 255, June 1927, pp. 205-206. Human element; technical education; smoke-abating apparatus; secondary air; additional combustion space.

Physiological Effect. What is Known About the Effect of Smoke on Health, W. C. White. Mech. Eng., vol. 49, no. 6, June 1927, pp. 655-656. Investigations on physiological effect of smoke; proposed plan for further investigation; physiological effects of carbon particles in smoke; physiological effects of other dusts in smoke.

SPEED REDUCERS

Caldwell. Caldwell Speed Reducers. Am. Mach., vol. 66, no. 23, June 9, 1927, pp. 995-996, 1 fig. Designed particularly for conveyor and elevator service, but is also applicable to other kinds of machines.

Motor Drive. Motor Drives Through Worm Speed Reducers, Chains and Variable-Speed Transmissions, G. Fox. Indus. Engr., vol. 85, no. 5, May 1927, pp. 209-215, 9 figs. Considerations involved in connecting motor to its load through worm-gear reduction units, variable- or adjustable-speed transformers and chain drives.

SPRINGS

Design. The Design of Small Springs, J. S. Barker. Am. Mach., vol. 66, no. 24, June 16, 1927, pp. 1018-1019. Presents table giving values of load divided by deflection per coil for various sizes of wire and coils.

Hairsprings for Instruments. The Manufacture and Properties of Hairsprings, H. Moore and S. Beckinsale. Inst. of Metals—advance paper, no. 424, for mtg., Mar. 9-10, 1927, 9 pp.; also abstract in Engineering, vol. 123, no. 3195, Apr. 8, 1927, pp. 439-440. Investigation at Research Department, Woolwich, into manufacture and properties of several types of hairsprings for instruments; related work, mainly of metallurgical nature, was also carried out on small springs used for other purposes; functions and essential properties of hairsprings and control springs; respective merits and disadvantages of steels, ferrous alloys and non-ferrous alloys; use of low-temperature heat treatments to restore elasticity, after cold working; steel hairsprings are subject to corrosion, but Elinvar is highly resistant; manufacture of phosphor-bronze and other hairsprings.

Heat Treatment. The C. N. R. Installs Spring Treating Plant. Ry. Mech. Engr., vol. 101, no. 6, June 1927, pp. 341-344, 6 figs. Electric furnace and salt bath for heating and drawing, at Stratford, Ont., shops, are pyrometer controlled.

Testing. Device for Testing Compression and Elongation of Springs. Iron Age, vol. 119, no. 23, June 9, 1927, pp. 1671-1672. Spring-testing machine, known as Elasticometer, placed on market by Coats Machine Tool Co., New York; device is essentially a precision beam balance with ratio of 10 to 1.

STACKS

Height. Effect of Height of Stack on Furnace Operation, W. H. Mawhinney. Fuels & Furnaces, vol. 5, no. 5, May 1927, pp. 579-581, 3 figs. As height of stack is increased, furnace pressure varies rapidly with variations in fuel consumption and changes in furnace pressure are much greater.

STANDARDIZATION

Agencies. Action Urged on Standardization, L. W. W. Morrow. Elec. World, vol. 89, no. 21, May 21, 1927, pp. 1057-1060. Agencies engaged in standards work; controversial situations indicated; need of national perspective and development of centralized authority.

Industrial Effects. Standardization and Its Effect on Industry, G. K. Burgess. Am. Mach., vol. 66, no. 20, May 19, 1927, pp. 808-809. Review of developments.

Limits of. The Sane Limits of Industrial Standardization, N. F. Harriman. Indus. Mgmt. (N. Y.), vol. 73, no. 6, June 1927, pp. 363-365. In business, standardization plays an important part; American industry is based upon quantity or mass production, and this, in turn, depends upon standardization; there are limitations to standardization of products; wherever special, individual requirements have to be met, factory-made article is out of place; standardization is antithesis of individuality; individuality is essence of art; there is little room for standardization in making of beautiful things.

STEAM

High-Pressure. The Economic Value of Increased Steam Pressure, H. L. Guy. Instn. Mech. Engrs.—Proc., no. 1, 1927, pp. 99-128 and (discussion) 129-213, 34 figs. Considers gains to be expected from adoption of increased pressures in simple condensing turbine installation; state of knowledge of properties of steam; effect of regenerative feed heating and resuperheating; increase in capital cost per kw. with increasing initial pressure at turbine stop valve.

Results Obtained with High-pressure Steam at Langerbrugge Power Station. Engineer, vol. 143, no. 3723, May 20, 1927, p. 550. Steam temperature employed, 840 deg. fahr., is higher than that of any other station in world and boiler pressure is 800 lb. per sq. in.; results of tests and operating results.

Rankine Cycle. Chart for Estimating the Efficiency of the Rankine Cycle. Engineering, vol. 123, no. 3202, May 17, 1927, p. 650, 1 fig. Main curves give theoretical thermal efficiency using saturated steam at pressures stated, and expanding it down to any vacuum between 27 and 29.1 in.

STEAM ENGINES

Binary-Vapor. Thermal Efficiency of Heat Engines with Special Regard to Binary-Vapor Engines (Thermische Wirkungsgrade von Wärmekraftmaschine mit besonderer Berücksichtigung der Zweistoffdampfmaschinen), O. Ernst. Wärme u. Kälte-Technik, vol. 29, no. 10, May 18, 1927, pp. 125-128. Points out that thermal superiority of internal-combustion engines is due to fact that initial temperatures are extraordinarily high; their superiority would be greater if it were not for fact that steam engine has advantage in regard to final temperatures; ideal machine would be one with very high initial and very low final temperature, in other words a combination of internal-combustion and steam engine; points out thermal advantage of so-called binary-vapor machine; refers to Emmet's mercury-vapor machine and results obtained with it.

Governing by Double Eccentric. Why Is a Double Eccentric Used? Power, vol. 65, no. 21, May 24, 1927, pp. 784-785, 7 figs. Principal limitation of simple D-slide valve is eliminated by double eccentric gear, and efficient means of governing is provided; throttle governor deliberately reduced available energy in all steam supplied to engine, while cut-off governor utilizes all energy available in smaller quantity of steam; double eccentric provides means of engine governing which makes possible utilization of full steam pressure at all loads, and improved engine efficiency.

High-Pressure. High-Pressure Steam Engine for German Paper Mill, C. H. S. Tupholme. Power, vol. 65, no. 24, June 14, 1927, pp. 917-918, 1 fig. Cross-compound engine developing normally 900 hp. and working with steam at initial pressure of 400 lb. per sq. in. and initial temperature of 660 deg. fahr.

Marine. Progress in Marine Steam Engineering (Fortschritte im Schiffsdampfmaschinenbau), C. Commentz. Werft-Reederei-Hafen, vol. 8, no. 8, Apr. 22, 1927, pp. 149-154, 9 figs. Describes two developments which, after extensive practical application, have given every satisfaction in service; first is new 4-cylinder reciprocating engine and resembles generally Woolf double compound engine; advantage of Woolf type over ordinary triple is elimination of receivers, loss corresponding being greatly reduced; other development consists of exhaust evaporator for non-condensing engines. See translated abstract in Mar. Engr. & Motorship Bldr., vol. 50, no. 598, June 1927, p. 238.

STEAM GENERATORS

Benson Super-Pressure. Experiences with the Benson Steam Generator, G. H. Gleichmann. Power, vol. 65, no. 22, May 31, 1927, pp. 838-840, 4 figs. For some time Siemens-Schuckert Co. has been operating its first experimental installation of Benson system; test results and experience obtained from over 2000 hours of its operation.

Steam Plant with Benson Boiler in Power Plant of Siemens-Schuckert Works (Dampfkraftanlage mit Benson-Kessel im Kraftwerk der Siemens-Schuckertwerke), W. Abendroth. V.D.I. Zeit., vol. 71, no. 20, May 14, 1927, pp. 657-663, 18 figs. Evaporation process; experimental plant; fittings; high-pressure feed pump; practical experiences and experimental results with high-pressure steam turbine.

STEAM POWER PLANTS

Characteristics. Some Characteristics of Modern Steam Plants, F. J. Garland. Eng. & Boiler House Rev., vol. 40, no. 11, May 1927, pp. 570-576, 2 figs. Layout of plant; auxiliaries; types of boilers.

Design. Considerations influencing the Design of Steam Generating Plants, W. H. Reynolds. Instn. Mech. Engrs.—Proc., no. 5, 1926, pp. 943-953, 5 figs. Deals with size of boiler; steam pressure, temperature and reheating; furnace design.

Recent Developments in Power Plant Design and Their Effect on the Economy of Generation, T. Roles. Engineering, vol. 123, no. 3203, June 3, 1927, p. 668. Review of developments in America and Europe. Abstract of paper read before Incorporated Municipal Electrical Assn.

High-Pressure. Economic Value of Increased Steam Pressure, H. L. Guy. Elec. Rev., vol. 100, no. 2579 and 2580, Apr. 29 and May 6, 1927, pp. 697-699 and 738-741, 14 figs. Results of investigations on effects of steam-pressure increase on operation and plant efficiencies and costs, with considerations on selection of particular pressures. Abstract of paper read before North-Western Branch of Inst. of Mech. Engrs.

Experimental Extra-High Pressure Steam Plant (Die Höchstdruck-Versuchsanlage von Gebrüder Sulzer in Winterthur), H. Neumann. Wärme, vol. 50, no. 13, Apr. 1, 1927, pp. 234-237, 9 figs. Details of plant in Winterthur works of Sulzer Bros. concern; diagram is presented showing layout of two parts of boiler, feed heaters, superheaters, pumps, etc.

The Use and Economy of High-Pressure Steam-Plants, A. L. Mellanby and W. Kerr. Instn. Mech. Engrs.—Proc., no. 1, 1927, pp. 53-98 and (discussion) 129-213, 16 figs. Field for high-pressure plants; main influences of high steam conditions; steam cycle and its probable limits; progress toward limits.

Hotels. Demand Factors and Heat Balances in Plant of World's Largest Hotel—The Stevens, J. A. Sutherland. Power, vol. 65, no. 23, June 7, 1927, pp. 879-881, 8 figs. Adequate service at minimum cost was goal of engineers who designed power and heating plant of world's largest hotel, which was recently opened.

New $700,000 Power Plant for Chalfonte-Haddon Hall Hotels (Atlantic City). Power, vol. 65, no. 22, May 31, 1927, pp. 826-831, 12 figs. Land limitation necessitates 6-story building; novel features incorporated in design; new plant proves efficient and reduces operating and maintenance expense.

STEAM POWER PLANTS

Industrial. Modernization of Industrial Power Plants, C. G. Spencer. Power, vol. 65, no. 26, June 28, 1927, p. 1010. Importance of modernizing industrial power plants is indicated by its coal consumption, which in 1923 was 31 per cent of total; discusses various methods of improvement. Abstract of paper read before Regional Industrial Power Meeting of Am. Soc. Mech. Engrs.

Lifting Heavy Equipment. Lifting Heavy Power-Plant Equipment, N. L. Rea. Power, vol. 65, no. 24, June 14, 1927, pp. 994-996, 8 figs. Attention is called to number of methods that have been used to lift heavy pieces of power-plant equipment that have proved satisfactory as to safety and building cost.

Steel Works. New Power Plant at Steel Works, H. W. Neblett. Blast Furnace & Steel Plant, vol. 15, no. 5, May 1927, pp. 234-241, 3 figs. Equipment installed in one of most modern power-generating stations of Colorado Fuel and Iron Co.; blast-furnace gas and powdered coal burned under boilers.

STEAM TRAPS

Types and Characteristics. Steam Traps, J. O. Frazier. S. Power Jl., vol. 45, no. 6, June 1927, pp. 53-58, 4 figs. Their general types and characteristics; their practical installation and operation, with particular reference to direct-return traps.

STEAM TURBINES

Bucket Wheels. The Application of Magnetics to the Inspection of Steam Turbine Bucket Wheels, J. A. Capp. Am. Soc. Testing Matls.—advance paper, no. 40, for mtg., June 20-24, 13 pp., 9 figs. Apparatus for testing turbine bucket wheels by which, without destroying wheel, homogeneity and soundness of steel may be quite accurately determined; method consists in indication of presence of defects by changes which they cause in reluctance of a magnetic circuit of which wheel under test is only variable part.

Elbow Design. New Data for the Design of Elbows in Duct Systems, L. Wirt. Gen. Elec. Rev., vol. 30, no. 6, June 1927, pp. 286-296, 19 figs. Data on losses in variety of elbows determined in new and it is believed, more accurate way in Turbine Research Laboratory of General Electric Co.; describes and evaluates large effect of aspect ratio on loss in elbows and describes how to design blade turns that reduce loss in bad elbows from 150 to 22 per cent of energy in velocity head.

High-Pressure. Geared Turbines for High and Maximum Pressures (Getriebedampfturbinen für hohe und höchste Drücke), H. Zürich. V.D.I. Zeit., vol. 71, no. 18, Apr. 30, 1927, pp. 595-599, 9 figs. Discussion of geared turbines; possibilities of their application, especially for heating and power plants; control equipment for extraction and back-pressure operation; details of high-pressure plant with geared turbines.

Materials for. Materials Employed in Steam-Turbine Construction (Die Werkstoffe im heutigen Dampfturbinenbau), A. Thum. V.D.I. Zeit., vol. 71, no. 22, May 28, 1927, pp. 753-763, 21 figs. Present aim in turbine construction; notched-bar effect in metals; fatigue failures; strength of materials at elevated temperatures; influence of manufacture on strength properties; materials for lowest parts and for blade.

Mixed-Pressure. Mixed-Pressure Turbines for Colliery Use, C. H. Naylor. Iron & Coal Trades Rev., vol. 114, no. 3087, Apr. 29, 1927, pp. 682–683. Choice between high-pressure turbo and mixed-pressure turbo-alternator drives; mixed-pressure turbine is so designed that it will utilize all low-pressure steam available before it makes call upon high-pressure steam; steam accumulators; comparisons of costs per year.

Oils. The Function of Oil in Steam Turbines (Le rôle et le travail de l'huile dans les turbines à vapeur), Trabord. Arts & Metiers, vol. 80, no. 78, Mar. 1927, pp. 91–100, 7 figs. Shows importance of function of oil; regulation; lubrication; origin of turbine oil; distillation.

Supersaturated Expansions. Super-Saturated Expansions. Engineering, vol. 123, no. 3199, May 6, 1927, pp. 535–537, 1 fig. If assumption is made that steam behaves in same way when it passes through turbine as it would in cylinder of reciprocating engine, it can be shown that hypothesis as to respective temperatures of vapor and condensate leads to results which are in good quantitative agreement with those observed in actual practice; in super-saturated expansions steam temperature follows Wilson line and condensate temperature saturation line.

Wetness of Steam, Influence of. Influence of Wetness of Steam on Steam-Turbine Operation (Einfluss der Dampfnässe auf Dampfturbinen), J. Freudenreich. V.D.I. Zeit., vol. 71, no. 20, May 14, 1927, pp. 664–667, 7 figs. Improvements in efficiency of steam turbine have also contributed to increasing wetness of steam in last stages, and simultaneously with this, increases in output have brought about increased peripheral velocities, particularly in same last stages; first visible consequence of operation of these influences appears in shape of erosion of blades in last stages, particularly those of rotor; also efficiency of low-pressure stages turns out to be below that which was expected; brake action of water in steam. See translation in Mech. Eng., vol. 49, no. 7, July 1927, pp. 799–801, 7 figs. See also Brown Boveri Rev., vol. 14, no. 5, May 1927, pp. 119–124, 7 figs.

Zoelly. Performance Tests on 11,000-Kw. Zoelly Steam Turbine (Leistungsversuche an einer 11,000 kw-Zoelly-Dampfturbine), A. Stodola. V.D.I. Zeit., vol. 71, no. 22, May 28, 1927, pp. 747–752, 4 figs. Results of tests on 10-stage turbine; measuring equipment and methods; evaluation of test results; thermodynamic balances.

STEEL

Heat-Resisting. Heat-Resisting Steels, W. H. Hatfield. Iron & Steel Inst.—advance paper no. 9, for mtg., May 1927, 26 pp., 1 fig. Account of investigations carried out in Brown-Firth Research Laboratories; behavior of steels of various compositions, produced by alloying them in different proportions; protective action of chromium is generally confirmed; influence of silicon and tungsten in further increasing resistance would appear to be fully established; influence of industrial gases. See also abstract in Iron & Coal Trades Rev., vol. 114, no. 2088, May 6, 1927, pp. 722–724.

Pickling. Some Notes on the Pickling of Steel, W. H. Ibbotson. Indus. Chemist, vol. 3, no. 27, Apr. 1927, pp. 147–148. Pickling by sulphuric acid; process using hydrochloric acid; review of salient points.

STEEL MANUFACTURE

Duplex Process. The Manufacture of Steel in India by the Duplex Process, B. Yaneske. Iron & Steel Inst.—advance paper, no. 16, for mtg. May 1927, 29 pp. Duplex process is combination of Bessemer and open-hearth methods of steel manufacture, and consists of desiliconizing, and partly or almost completely decarburizing, molten pig iron from blast furnace in acid-lined Bessemer converter, and subsequently dephosphorizing metal in basic open-hearth furnace; this process is practiced successfully in India by Tata Iron and Steel Co. under difficult climatic conditions with more than 99 per cent of native labor at their works at Jamshedpur. See also abstract in Iron & Coal Trades Rev., vol. 114, no. 2088, May 6, 1927, pp. 727–732.

Processes. The Quality of Steel and Its Relation to Manufacturing Methods (Ueber Stahlqualitäten und ihre Beziehungen zu den Herstellverfahren), P. Goerens. Kruppsche Monatshefte, vol. 8, Jan. and Feb. 1927, pp. 1–8 and 25–48, 31 figs. Discusses what is meant by quality of steel; it depends largely on amount and nature of impurities, whose effect again depends on form in which they are present, viz., in solid solution or as mechanically held compounds or inclusions; general requirements of steel making; considers various problems in detail, including Bessemer process, basic Bessemer or Thomas, open-hearth, crucible and electric-furnace processes. See also translated abstract in Metallurgist (supp. to Engineer), May 27, 1927, pp. 75–78, 4 figs.

STEEL WORKS

Waste-Heat Utilization. Waste-Heat Utilization at an Iron and Steel Works. Power Engr., vol. 22, no. 255, June 1927, pp. 208–219 and 227, 22 figs. Describes generating plant and interesting applications of power at Iron and Steel Works of Consett Iron Co., Ltd., Durham.

STOKERS

Underfeed. Underfeed Stokers Show Steady Improvement, J. G. Worker. Power Plant Eng., vol. 31, no. 11, June 1, 1927, pp. 615–617. Multiple-retort underfeed stoker successfully adpated to coal from all fields and for use with water walls and preheated air.

STRESSES

Fillets Under Loading. Stresses in Fillets Under Transverse, Tension or Compression Loadings and Under Torsion Loading, E. F. Garner. Sibley Jl. of Eng., vol. 41, no. 5, May 1927, pp. 150–151 and 166 and 168, 4 figs. Since maximum stress in fillet is highly localized it may yield point stress without showing any permanent deformation to member as a whole; if material is ductile, rearrangement of stress distribution may take place by change in fillet radius but if material is very hard under repeated stressing or impact loading, cracks may occur in highly stressed portions of fillets and endurance limit be greatly reduced.

T

TANKS

Elliptical, Stresses in. Stresses Occurring in the Walls of an Elliptical Tank Subjected to Low Internal Pressures, W. M. Frame. Mech. Eng., vol. 49, no. 6, June 1927, pp. 619–624, 12 figs. Describes test made on elliptical tank ,and presents analysis based on experimental data, from which stresses set up in walls may be calculated.

THERMOCOUPLES

Metals and Alloys for. Metals and Alloys for Thermocouples for the Measurement of High Temperature (Metalle und Legierungen für Thermoelemente zur Messung hoher Temperaturen), W. Rohn. Zeit. für Metallkunde, vol. 19, no. 4, Apr. 1927, pp. 138–144, 4 figs. Deals with thermocouples of platinum and platinum-rhodium, thermoelectric alloys of other than rare metals; oxidation resistance of nickel and chrome-nickel alloys of varying chrome content; interchangeability of thermocouples; protective tubes for thermocouples, especially for protection against molten copper.

Temperature Measurement with. Temperature Measurement with Thermocouples (Verfahren der Temperaturmessung mit Thermoelementen). Zeit. für Metallkunde, vol. 19, no. 4, Apr. 1927, pp. 144–148, 11 figs. Methods for direct and indirect measurement of electromotive force of thermocouples, their sources of error and accuracy obtainable.

THERMOMETERS

Specifications. Report of Committee D-15 on Thermometers. Am. Soc. Testing Matls.—advance paper, no. 68, for mtg., June 20–24, 2 pp.

TIME STUDY

Morale as Factor. Morale as a Factor in Time-Study Technique, M. L. Cooke. Mech. Eng., vol. 49, no. 6, June 1927, pp. 595–599, 2 figs. As illustrated by recent investigation of production standards used in garment industry in Cleveland, Ohio.

Observer's Analysis. Analyzing the Production Operation, E. F. Brown. Am. Mach., vol. 66, no. 24, June 16, 1927, pp. 999–1000. Attempts to show how efficient time-study man analyzes all phases of operation, as well as studies the worker.

TIRES, RUBBER

Pressure Indicators. A Tyre Pressure Indicator, B. Joy. Automobile Engr., vol. 17, no. 228, May 1927, p. 187. Experimental device for tire testing on road or track.

TRACTORS

Farm. Motor Tractor with Two-Cylinder Hot Bulb Engine. Engineering, vol. 123, no. 3201, May 20, 1927, pp. 604–606, 5 figs. Details of tractor with hot-bulb engine constructed by Swedish firm; machinery is built up into one block of castings which takes place of separate frame.

Lug Studies. Tractor Lug Studies on Sandy Soil, J. W. Randolph. Agric. Eng., vol. 8, no. 4, Apr. 1927, pp. 71–75, 5 figs. Field studies on sandy soil at Alabama Agricultural Experiment Station; factors effecting traction of wheel tractors. See reference to first article in Eng. Index, 1926, p. 761.

TURBO-GENERATORS

100,000-Kw. Another "Largest" Turbine. Power, vol. 65, no. 22, May 31, 1927, pp. 832–833, 2 figs. Commonwealth Edison Co. of Chicago, Ill., placed with South Philadelphia Works of Westinghouse Elec. & Mfg. Co., order for 100,000-kw. steam turbine-generator unit and necessary condensing equipment.

V

VIBRATIONS

Mechanical, Measurement of. The Measurement of Mechanical Vibrations (Messung mechanischer Schwingungen), H. Steuding. V.D.I. Zeit., vol. 71, no. 18, Apr. 30, 1927, pp. 605–608. This report is abstract of work which was awarded first prize by Scientific Council of Verein deutscher Ingenieure for best work on measurement of mechanical vibrations.

VOCATIONAL TRAINING

Great Britain. Vocational Guidance in Great Britain, C. E. Clift. Int. Labour Rev., vol. 15, no. 4, Apr. 1927, pp. 547–567. Present system comprises both juvenile advisory committees, working under Ministry of Labor in connection with employment exchanges, and choice of employment committees under local education authorities, the two schemes working in coöperation.

W

WAGES

Relation to Costs. High Wages and Prosperity, H. H. Williams. Indus. Mgmt. (N. Y.), vol. 73, no. 6, June 1927, pp. 325–327. Discusses transparent delusion that high wages mean higher costs; revelation of facts; high wages force adoption of machinery, with resultant lower costs.

WATER FILTRATION

Experimental Plant. Working in Laboratory and Experimental Plant to Solve Filtration Problems. Water Wks., vol. 66, no. 6, June 1927, pp. 225–227, 5 figs. Chicago is building experimental plant large enough for actual plant for average city in order to solve problems encountered in filtering its water supply before committing itself on design of actual plants.

WATER POWER

German Museum Exhibits, Munich. The Water Power Section of the Deutsches Museum in Munich (Die Abteilung Wasserkraft des Deutschen Museums in München), Adrian. V.D.I. Zeit., vol. 71, no. 18, Apr. 30, 1927, pp. 600–602, 5 figs. On ground floor are exhibits of machinery, and in basement there is detailed representation of developments of water-power machines and hydroelectric plants.

WATER TREATMENT

Gasoline Plant. Water Treatments, Costs and Reactions, F. B. Good. Oil & Gas Jl., vol. 26, no. 1, May 26, 1927, p. 100. Modern methods, analyses, causes and troubles due to waters, corrosion and incrustation. Paper read before Assn. of Nat. Gasoline Mfrs.

Waste Water. Industrial Waste Waters and Their Treatment (Les eaux résiduaires industrielles et leur traitement), E. Rolants. Technique Moderne, vol. 19, no. 8, Apr. 15, 1927, pp. 237–246, 5 figs. Describes modern purification methods and their application to waste waters from sugar factory, etc.

WELDING

Cast Aluminum. Welding Cast Aluminum. Mech. World, vol. 81, no. 2107, May 20, 1927, pp. 357–358. Describes operations and makes recommendations for welding.

Research. Developments and Research in Welding, D. H. Deyoe. Am. Welding Soc.—Jl., vol. 6, no. 4, Apr. 1927, pp. 48–58, 12 figs. New magnetic-clutch-type automatic welder and control; travel carriage for automatic welders; multiple-arc automatic welder; straight seam welders for range boilers, small and large tanks and pipe; control of magnetic fields in arc when welding; pneumatic banking bar; circular seam welders; atomic-hydrogen welding and shrouded arc welding; electrodes; metallurgical research; copper-tungsten electrode for spot welders; all-steel arc-welded railroad tie.

Welding Research Activities of the Newport News Shipbuilding & Dry Dock Company During 1926, J. W. Owens. Am. Welding Soc.—Jl., vol. 6, no. 4, Apr. 1927, pp. 59–73, 9 figs. Deals with research in resistance, gas, metallic-arc and thermit welding, corrosion tests.

Structural Steel. Application of Welding to a Steel Structure, J. H. Edwards. Am. Iron & Steel Inst.—advance paper, for mtg., May 20, 1927, 37 pp., 22 figs. Deals with electric resistance method, and fusion welding, either gas or electric.

Thermit. Research Activities of the Metal and Thermit Corp., J. H. Deppeler. Am. Welding Soc.—Jl., vol. 6, no. 4. Apr. 1927, pp. 43–46. Research activities of this corporation are carried on at its Jersey City plant; work includes welding research which has to do with development of iron thermits that will produce steel of proper physical characteristics.

Thermit Welding Practice Improved. Welding Engr., vol. 12, no. 5, May 1927, pp. 32–33, 3 figs. New methods of design and procedure reduce amount of materials used and improve quality of weld.

WELDS

Fatigue of. Fatigue of Welds, R. R. Moore. Am. Welding Soc.—Jl., vol. 6, no. 4, Apr. 1927, pp. 11–32, 21 figs. Results of tests relating to welding metal thicknesses not greater than $^5/_{16}$ in. and usually not over $^1/_{16}$ in., such as in case of steel-tube fuselage with welded joints; results are given for gas and arc welds and for atomic-hydrogen process; cast-steel tests; although tensile efficiency was better than 75 per cent, fatigue strength was as low as 13 and never higher than 35 per cent of tensile strength of weld; poor fusion has drastic effect upon resistance of weld to repeated stresses.

WIRE

Forming. Wire Forming Applied to Ring Manufacture, F. Server. Wire, vol. 2, no. 5, May 1927, pp. 158–160, 6 figs. Shows number of dies used for cutting and forming wire into rings.

WIRE DRAWING

Steel. The Drawing of Steel Wire and Its Relation to Qualities of Steel, E. A. Atkins. Iron & Coal Trades Rev., vol. 114, no. 2088, May 6, 1927, pp. 732–739, 5 figs. Flow of metal in drawing; segregated steel; effect of non-metallic inclusions; cause of wire "running out" or not sizing correctly; nature of hard inclusions; making of clean steel suitable for wire-drawing; dissolved oxide in steel; effect of accidental constituents in steel; effect of varying carbon contents and temperature on annealing for subsequent cold work; cementite in mild-steel wire; effect of varying analyses on tempering. See also Engineering, vol. 123, no. 3200, May 13, 1927, pp. 591–594. Paper read before Iron & Steel Inst.

THE ENGINEERING INDEX

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Mechanical Engineering Section

THE ENGINEERING INDEX presents each month, in conveniently classified form, items descriptive of the articles appearing in the current issues of the world's engineering and scientific press of particular interest to mechanical engineers. At the end of the year the monthly instalments are combined along with items dealing with civil, electrical, mining and other branches of engineering, and published in book form, this annual volume having regularly appeared since 1906. In the preparation of the Index by the engineering staff of The American Society of Mechanical Engineers some 1200 technical publications received by the Engineering Societies Library (New York) are regularly reviewed, thus bringing the great resources of that library to the entire engineering profession.

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ABRASIVES

Dust Hazard. Discuss Abrasive Dust Hazard, W. I. Clark and E. B. Simons. Abrasive Industry, vol. 8, no. 7, July 1927, pp. 230–232. On basis of 14 years' observation and of data presented, following conclusions seem to be justified: in factories which provide proper methods of dust removal, continuous inhalation of artificial abrasive dust, extending over many years, does not produce symptoms or present X-ray findings of pneumonokoniosis; workers who habitually use grinding wheels will run but slight risk of developing pneumonokoniosis if they use artificial abrasive rather than sandstone wheels for all grinding operations, and if machines upon which artificial abrasive wheels are mounted are properly hooded and excessive dust removed by suction fans. Reprinted from Jl. of Indus. Hygiene.

AERONAUTICS

European Commercial. Developments in European Commercial Aeronautics, B. V. York. Commerce Reports, no. 25, June 20, 1927, pp. 699–700. Greater coöperation, improved safety devices, and extended facilities mark latest developments in European Air Services.

AIR COMPRESSORS

Portable. A New Portable Air Compressor. Engineer, vol. 144, no. 3729, July 1, 1927, p. 18, 2 figs. Plant comprises four-cylinder compressor and is fitted with typhoon-type gearing; made by Broom and Wade.

AIR CONDITIONING

Auditoriums. The Cooling and Ventilation of the Minneapolis Auditorium, S. C. Bloom. Heat. & Vent. Mag., vol. 24, nos. 5 and 6, May and June 1927, pp. 53–58 and 58–60 and 62, 4 figs. Details of installation requiring 413,000 cu. ft. of air per minute, cooled by 3,000,000 gal. of well water per day. Abstract of paper presented before Chicago Section of Am. Soc. Refrig. Engrs.

Humidifying. Humidification and Its Cost, H. L. Alt. Heat & Vent. Mag., vol. 24, no. 6, June 1927, pp. 75–77, 2 figs. Comparison of saving and expenditure of heat by increasing moisture content in air.

Match-Making Plant. Ohio Match Company Makes Its Own Climate, T. Chester. Power Plant Eng., vol. 31, no. 12, June 15, 1927, pp. 656–660, 9 figs. Continuous operation of match-making machinery at Wadsworth, Ohio, plant, without regard to outside atmospheric conditions, was made possible by installation of air-conditioning equipment.

AIRCRAFT

Industry. Aircraft Resources, J. P. Van Zandt. West. Soc. Engrs.—Jl., vol. 32, no. 5, June 1927, pp. 164–169. Gives position of manufacturers of aircraft and reviews phases of air transport as it exists today; operators and manufacturers seem confident of their ability to handle any traffic that may be offered for transport by air and await growth of this business; greatest need is for adequate landing fields.

AIRPLANE ENGINES

Dynamical Forces. Dynamical Forces in Aircraft Engines, J. Morris. Roy. Aeronautical Soc. —Jl., vol. 31, no. 198, June 1927, pp. 577–585, 8 figs. Observations on Major Carter's paper; includes reply to Captain Morris' observations.

French Failures. French Airplane Engine Failures Analyzed to Find Causes. Automotive Industries, vol. 56, no. 23, June 11, 1927, pp. 898–900. Most accidents in 1926 traced to mixture-supply systems with ignition trouble second and crank-train failures third; greater protection is needed against fires.

Wright Whirlwind. Lindbergh's Wright Whirlwind a Result of Seven Years' Development. Aviation, vol. 22, no. 25, June 20, 1927, pp. 1358–1359 and 1396, 2 figs. Work began on Feb. 28, 1920, and since that time 7 years' successive models of air-cooled radial engines have been produced.

The Wright Whirlwind Engine, F. C. Duston. Machy. (N. Y.), vol. 33, nos. 11 and 12, July and Aug. 1927, pp. 805–810 and 917–922, 28 figs. Engine that made Lindbergh's, Chamberlin's, and Byrd's record-making flights possible; constructional features and machining operations.

AIRPLANE PROPELLERS

Wind Tunnels. The Design of an Airplane Propeller with Constant Circulation on the Blade Section, for Use in Wind Tunnels (Berekening van een ventilator-schroef met constante circulatie om de bladdoorsnede, ten gebruike in een windkanaal), J. M. Burgers. Ingenieur, vol. 42, no. 19, May 7, 1927, pp. 398–408, 5 figs. Mathematical analysis with frequent references to English, German, and Russian studies.

AIRPLANES

Accessories. Airplane Accessories (Les accessoires des avions), P. Franck. Aérotechnique, vol. 9, no. 97, June 1927, pp. 173–175, 3 figs. Details of accessories vital to airplanes; importance of scientific study of all problems regarding piloting, navigation, security, and operation of airplane.

Autogyro. The Theory of the Autogyro, H. Glauert. Roy. Aeronautical Soc.—Jl., vol. 31, no. 198, June 1927, pp. 483–498 and (discussion) 498–508, 6 figs. Deals with physical basis on which analysis rests and explains, as far as possible, any analytical results in terms of physical facts which they represent; conclusions which can be drawn from theory; discusses various aspects of problem; behavior of freely rotating windmill regarded as lifting surface.

Bellanca. Giuseppe M. Bellanca Has Been Designing Successful Airplanes since 1908. Aviation, vol. 22, no. 26, June 27, 1927, pp. 1434–1435 and 1448. Noteworthy designs include first tractor biplane, Roos-Bellanca and record-breaking Columbia.

Consolidated Courier. The New Consolidated Courier. Aviation, vol. 23, no. 1, July 4, 1925, p. 26, 1 fig. Powered with a Wright Whirlwind and designed to meet Air Corps specifications for advanced training planes.

Design. Apparent Present Tendencies in Airplane Design, V. E. Clark. Mech. Eng., vol. 49, no. 7, July 1927, pp. 727–730, 6 figs. Review of recent developments and practice in various countries, pointing out successful results obtained with designs of widely different types.

Dornier. Mittelholzer's Flight Through Africa in a Dornier "Merkur" Airplane. Eng. Progress, vol. 8, no. 5, May 1927, p. 118, 2 figs. Machine's all-metal construction offered special safety against atmospheric influences of variable climatic conditions; constant changes of moisture and temperature would have rendered wood an unsuitable material; engine BMW VI of the Bayerische Motoren-Werke A.-G. in Munich offered output reserve of about 50 per cent, owing to its very low fuel consumption of 1.6 lb. per mi.; traveling speed, 94 mi. per hr.

Landing Gear. New Systems of Landing Gear (Nouveaux systèmes de trains d'atterrissages), Aérotechnique, vol. 9, no. 96, May 1927, pp. 141–143, 5 figs. Details of recent types of landing gear, including Avimeta wheel, Bechereau shock absorber, Blériot elastic wheel, and landing gear of Les Mureaux airplanes.

Reliability Tour. Standardization Marks Reliability Tour. Aviation, vol. 23, no. 2, July 11, 1927, pp. 77–79. Twelve out of fourteen entrants have Wright Whirlwinds and wheel brakes, while all are using metal propellers.

Russian Raid. Russian Raid Plane (L'avion d'un grand raid), M. J. Pogoski. Aéronautique, vol. 9, no. 94, Mar. 1927, pp. 69–72, 5 figs. Details of biplane which flew from Moscow to Paris, Rome and return, 4000 miles within 3 days with total flying time of 34 hours and 15 minutes and average speed of 117 m. p. h.; it is all-metal two-passenger plane manufactured from duralumin; engine is Napier 450-hp,

Ryan. "The Spirit of St. Louis." Flight, vol. 19, no. 23, June 9, 1927, pp. 376–379 and 385, 10 figs. Details of Ryan monoplane. See also description in Aeroplane, vol. 32, no. 23, June 8, 1927, pp. 684–688.

Streamline Curvature. Effect of Streamline Curvature on Lift on Biplanes, L. Prandtl. Nat. Advisory Committee for Aeronautics—Tech. Memorandum, no. 416, June 1927, 11 pp. 2 figs. Problem is divided into two parts: (1) to determine lift of wing which is situated in curvilinear flow; and (2) to calculate curvature which one wing of biplane produces in vicinity of other; combination of these two relations leads to desired result.

AIRSHIPS

Status of. Reflections on the Airship Situation, C. E. Rosendahl. U. S. Nav. Inst.—Proc., vol. 53, no. 7, July 1927, pp. 745–758. Discussion of merits of airship project; points out salient factors in history of airships that have escaped public attention largely because this information has not been available as freely as have other features; endeavors to show that airships have been restricted by certain features yet undeveloped, some more or less logically so, that have made full and fair demonstration of airship capabilities generally impracticable.

ALUMINUM

Brewery Industry. Aluminium in the Brewery Trade, M. von Schwarz. Eng. Progress, vol. 8, no. 5, May 1927, pp. 129–130, 6 figs. Experience in pre- and post-war times has shown aluminum to be eminently suitable for fermenting and storage casks, for yeast cultivators, and numerous smaller implements and utensils in brewery trade; degree of purity of aluminum best suited for such brewing utensils and implements is not definitely determined yet; presumably, aluminum with purity of 99 per cent will be given preference over qualities containing 98 to 99 or 99.5 per cent of pure aluminum.

AMMONIA COMPRESSORS

Clearance Pockets. Why Clearance Pockets in Ammonia Compressors? G. Grow. Power, vol. 66, no. 2, July 12, 1927, pp. 58–59, 4 figs. Influence

NOTE.—The abbreviations used in indexing are as follows:

Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

of clearance on compressor output; why variable clearance is needed on constant-speed machines; how increasing clearance affects mean effective pressure.

APPRENTICES, TRAINING OF

Foundry. Grade Apprentices by Merit, C. H. Ross. Foundry, vol. 55, no. 13, July 1, 1927, pp. 516–517. Molder apprentices in plant are grouped into three classes; earn-and-learn method is employed in advancing them from one group to another.

Navy Methods. Applying Navy Methods in Apprentice Training, A. H. Rodrick. Am. Mach., vol. 67, no. 1, July 7, 1927, pp. 1–3. Apprentice training, to compete today against social conditions that tend to draw boys away from shop, must be attractive; by efficient organization, personal touch, and assured thoroughness; Navy has put much of this desired element into its apprenticeship courses.

Railways. Railway Apprenticeship in a National Apprenticeship Plan, F. W. Thomas. Mech. Eng., vol. 49, no. 8, Aug. 1927, pp. 886–887 and (discussion) 887–888. Present-day requirements of railway mechanics; Santa Fe's apprentice system; school work supplementing shop instruction; outside apprentice activities; results.

Recruiting. The Recruiting of Apprentices (Lehrlingswerbung), Lischka. Giesserei, vol. 12, no. 23, June 4, 1927, pp. 391–393, 5 figs. Describes organization of Düsseldorf industrial circles who have founded exhibition of apprentices' work, in which lectures are held and propaganda carried on for recruiting of industrial workers.

ASBESTOS

Plastics, Use in. The Use of Asbestos in Plastics (Die Verwendung von Mikro-Asbest für die Herstellung plastischer Massen), H. Rosenberg. Kunststoffe, vol. 17, no. 3, Mar. 1927, pp. 55–57. Particular grade, sometimes known as micro-asbestos is especially useful as inert and heat-resistant filler. See English translation in Plastics, vol. 3, no. 6, June 1927, pp. 274–275 and 286.

ASH HANDLING

Boiler Furnaces. Ash-Removal Equipment (Eine bemerkenswerte Entaschungsvorrichtung), F. Stipernitz. Archiv für Wärmewirtschaft, vol. 8, no. 6, June 1927, p. 180, 2 figs. Discusses scavenging device which permits automatic removal of slag from boiler, even when ashpit is set low.

AUTOMOBILE ENGINES

Air Cleaners. Efficiency Test for Radiator-Fan-Type Air-Cleaners, A. H. Hoffman. Soc. Automotive Engrs.—Jl., vol. 21, no. 1, July 1927, pp. 82–86, 6 figs. Since air cleaners of radiator fan type cannot be tested satisfactorily by older method, in which known weight of dust is fed directly into air stream entering air cleaner, special method was found necessary in which air cleaner under test is mounted in its normal position behind radiator fan that is located inside of elliptical wind tunnel within which fan circulates air.

Crankcase Scavenging. Crankcase Scavenging of a Two-Stroke Engine (Die Kurbelkastenspulung eines Zweitaktmotors), O. Holm. V.D.I. Zeit., vol. 71, no. 24, June 11, 1927, pp. 847–850, 22 figs. Results of tests; influence of systematic change in height of scavenging and exhaust opening on scavenging process.

Horsepower Formula. Changes Made in French Horsepower Formula. Automotive Industries, vol. 57, no. 3, July 16, 1927, p. 80. Rules will be applied in future in case of acceptance of any new type of chassis, as well as to vehicles not belonging to type which has been presented to and accepted by Department of Mines.

Improvement of. Methods of Improving the Efficiencies and Powers of Motor Car Engines, G. L. DeLaplante. Univ. of Toronto Eng. Soc.—Trans., Apr. 1927, pp. 49–63, 9 figs. If design followed principles outlined by author, engine would resemble present racing-car engine, much more than present automobile engine; it would be small, compact, powerful, flexible, highly efficient and would probably use single sleeve-valve construction to ensure desired quietness; outstanding features would be supercharger, high speed and steam cooling.

Radiators. Water Cooling in Automobiles (Die Wasserrückkühlung in Kraftfahrzeugen), L. Richter. V.D.I. Zeit., vol. 71, no. 23, June 4, 1927, pp. 827–830, 6 figs. Diagrammatic presentation of characteristics of radiators; basic equations for joint work of engine, radiator and ventilator; calculation of transmission ratio and drive of radiator; other applications of calculating method.

Straight-Eight. The Straight-Eight Engine, E. W. Sisman. Automobile Engr., vol. 36, no. 230, July 1927, pp. 268–276, 9 figs. Reasons leading to adoption of straight-eight are: (1) High ratio of mean to maximum torque; (2) reciprocating parts are in both primary and secondary balance; (3) more efficient cooling than engine with lesser number of cylinders for given piston displacement; (4) decreased stresses in working parts for given piston displacement and given speed.

AUTOMOBILE INDUSTRY

Production Statistics. Extent of World Modernization on January 1, 1927, I. H. Taylor. Commerce Reports, no. 26, June 26, 1927, pp. 799–802. New census shows 27,650,267 automobiles in world use.

AUTOMOBILE MANUFACTURING PLANTS

Marmon. The Marmon "8," F. H. Colvin. Am. Mach., vol. 67, no. 1, July 7, 1927, pp. 19–23, 14 figs. Compact and efficient shop layout for securing quantity and quality of product at reasonable cost; fixtures and methods in machining cylinder blocks and cylinder heads.

Production Jobs. Three Unusual Production Jobs in an Auto Shop, F. H. Colvin. Am. Mach., vol. 66, no. 26, June 30, 1927, pp. 1091–1092, 5 figs. Special mandrel for scribing and facing crankcases; methods used in assembling valve-operating mechanism; oil pumps tested under working conditions.

AUTOMOBILES

Bodies. Tomorrow's Trend in Automobile Body Designing, R. H. Dietrich. Soc. Automotive Engrs.—Jl., vol. 20, no. 6, June 1927, pp. 766–769, 3 figs. Author asserts that governing factors will be low appearance, good proportions, harmonious exterior coloring, and comfortable seating; simplicity will be one of more refined points in body trend, and soft pastel shades in finish are coming into vogue.

Brakes. Automobile Brakes (L'éstablissement des organes d'un frein, en particulier d'un frein d'automobile). Pratique des Industries Mécaniques, vol. 10, no. 3, June 1927, pp. 107–115, 23 figs. Study of diverse principles for brakes, especially brakes with interior jaws, mainly used in construction of automobiles.

The Torque-Equalized Brake, G. L. Smith. Soc. Automotive Engrs.—Jl., vol. 20, no. 6, June 1927, pp. 754–760, 8 figs. Means of accomplishing torque equalization and results of tests of torque-equalizing mechanisms of various designs, together with accompanying charts.

Finishes. The Application of Automobile Finishes. Automotive Mfr., vol. 69, no. 3, June 1927, pp. 11–12. Four principal methods compared and contrasted; number of coats needed; development of spraying and spray gun; flow coating and brushing.

Paris Show. Exhibition of Touring Cars at Paris Show, October, 1926 (Le Salon de Paris des Automobiles de Tourisme en Octobre 1926), M. Keraval. Industrie des Voies Ferrées et des Transports Automobiles, vol. 21, no. 244, Apr. 1927, pp. 196–201. Methodical study of different parts of touring cars and criticism of particular designs adopted by different makers.

Rear Axles. Austrian Car Builder Patents Swinging Rear Axle. Automotive Industries, vol. 57, no. 4, July 23, 1927, p. 115, 1 fig. Several makers of cars in Europe arrange their rear axles so that each half can swing independent of other half; this permits of mounting differential housing on frame and reduces unspring weight, thereby improving riding qualities; details of Steyr patented swinging axle.

Springs. Notes on Valve-Spring Surge, W. T. Donkin and H. H. Clark. Soc. Automotive Engrs.—Jl., vol. 20, no. 6, June 1927, pp. 722–726, 1 fig. Study of influence of vibration on valve springs reveals two possible ways in which they can vibrate: first, when frequency of forced vibration is low, force tending to vibrate spring is small, etc., spring vibrates as part of entire vibrating system; second, if forced vibration is of rather high frequency and of such value that it is arithmetical factor of natural frequency of spring, condition of resonance may be set up whereby spring vibrates in itself at its own frequency; analysis of surge effected with aid of super-speed motion-picture film and vibroscope.

Torque Amplifier for Steering. New Device Uses Engine Power to Reduce Steering Effort. Automotive Industries, vol. 56, no. 23, June 11, 1927, pp. 896–897, 3 figs. Torque amplifier developed by Bethlehem Steel Co., consists of two small drums driven in opposite directions at slow speed by universal-jointed shaft.

Transmissions. An Internal-Geared Four-Speed Transmission, S. O. White. Soc. Automotive Engrs.—Jl., vol. 20, no. 6, June 1927, pp. 761–765, 5 figs. Intensive study of vibrations has had to be made by transmission manufacturers who were seeking means of obviating car noise known as high-speed rattle and which makes itself heard through transmission case, although it is caused mainly by periodic vibrations in engine and propeller shaft; out of this study has come revival of idea of using fast rear axle, that is, one having low ratio between engine and driving axle, whereby rotative speed of crankshaft and propellor shaft can be reduced greatly and vibrations at given road speed diminished.

Synchronized Positive Clutch Transmission Aims to Make Gear Shifting Noiseless. Automotive Industries, vol. 57, no. 3, July 16, 1927, p. 97, 2 figs. Double clutching is not necessary when shifting to lower gear; improved car acceleration is claimed.

AUTOMOTIVE FUELS

Alcoholic Base. Fuel Oils of Alcoholic Base for Automobile Engines (Spirytusowe mieszanki napedowe), K. Taylora. Przeglad Techniczny, vol. 65, no. 3, Jan. 19, 1927, pp. 26–29. Account of research conducted at Warsaw Polytechnic college, using various mixtures and makes of American and European automobiles; indicator diagrams, curves, etc.

Anti-Knock Compounds. Anti-Knock Agents (Considérations sur le mode d'action des antidétonants), C. Moureu. Chimie & Industrie, vol. 17, no. 4, Apr. 1927, pp. 531–535. Theories of mechanism of anti-detonant effect are compared and discussed; experimental evidence indicates that effect is essentially anti-oxidant action; hence conclusion is drawn that anti-knock agents function simply by negative catalysis; that is, they retard attack of oxygen on fuel.

The Effect of Metallic Vapours on the Ignition of Substances, A. Egerton and S. F. Gates. Instn. Petroleum Technologists—Jl., vol. 13, no. 61, Apr. 1927, pp. 244–255, 1 fig. Results of series of experiments; anti-knocks such as lead tetraethyl, raise self-igniting temperature of certain combustible vapors; lead volatilized or dispersed by means of arc in nitrogen or argon has comparable effect.

Note on the Effect of Certain Organic Compounds on the Igniting and "Knocking" Characteristics of Petrol. A. Egerton and S. F. Gates. Instn. Petroleum Technologists—Jl., vol. 13, no. 61, Apr. 1927, pp. 273–280. Apart from aryl amines and certain other nitrogenous derivatives, no other substances have been found similarly effective in preventing knock except ethyl iodide, quinone, cresol, phenol and diphenyloxide, but none of these are as effective as aniline; meta compounds are usually slightly more effective than ortho and para compounds.

The Significance of Igniting Temperatures, A. Egerton and S. F. Gates. Instn. Petroleum Technologists—Jl., vol. 13, no. 61, Apr. 1927, pp. 256–272, 1 fig. Experiments made on conditions affecting igniting temperatures; discusses significance of such temperatures.

Theories of Antiknock Action, A. Egerton and S. F. Gates. Instn. Petroleum Technologists—Jl., vol. 13, no. 61, Apr. 1927, pp. 281–299. Develops theory of combustion through autoxidation and of anti-knock action; summary of main facts regarding anti-knocks.

Future Supplies. Fuel for Internal Combustion Engines, F. L. Nathan. Chem. & Industry, vol. 46, no. 24, June 17, 1927, pp. 211t–220t. Conclusions as regards future supplies of fuels for internal-combustion engines are that: gasoline will continue for long time to be principal liquid fuel; motor alcohol could be produced in enormous quantities from shale should supplies from petroleum tend to become exhausted; limited quantities of benzol are produced in gas works and coke ovens; any considerable increase is unlikely; alcohol from whatever sources cannot become generally available, and it certainly could not compete with gasoline at anything like the present price of latter; low-temperature carbonization and hydrogenation of coal may, before long, produce appreciable quantities of motor fuels; production of synthetic motor fuels from carbon monoxide and hydrogen is passing from experimental stage; suction-gas producers, using anthracite, coke, or charcoal, should be developed, especially for use with motor trucks.

Motor Fuels: Present and Future, J. Boot. Oil Eng. & Technology, vol. 8, no. 4, Apr. 1927, pp. 135–136. Summary of possible developments of supplies of fuels as alternatives to petroleum.

Heavy. Experimental Investigation of the Physical Properties of Medium and Heavy Oils (Experimentelle Untersuchung der physikalischen Eigenschaften mittlerer und schwerer Brennstoffe, ihre Verdampfung und Verwendung im Explosionsmotor), F. Heinlein. Motorwagen, vol. 29, no. 31, Nov. 10, 1926, pp. 775–779, 4 figs. Conclusions based on theoretical investigation. Conclusion of series published in earlier issues of journal. See reference to preceding articles in Eng. Index 1926, p. 61.

Starting Ability. Lean Explosive-Limits for Cracked and Straight-Run Gasoline and Other Motor Fuels, D. C. Ritchie. Soc. Automotive Engrs.—Jl., vol. 21, no. 1, July 1927, pp. 15–18, 6 figs. Method of determining limiting explosive mixtures of air and fuel vapor has been developed and applied to numerous motor fuels; data obtained indicate that lean explosive limit of 25 air-fuel ratio applies to quiescent mixtures of air and vapors of such fuels when ignited at center of closed bomb of sufficient capacity; this value was found to apply equally well to cracked and straight-run gasolines.

AVIATION

Aerodynamic Safety. Importance of Aerodynamic Safety in Aviation, H. F. Guggenheim. Mech. Eng., vol. 49, no. 7, July 1927, pp. 719–732, 4 figs. What is meant by safety in aviation; flying hazards and how they are being overcome; Daniel Guggenheim Safe Aircraft Competition and its object; safety tests and demonstrations of competition and basis of award of prize.

Air Mail. The Air Mail Service, D. B. Coyler. West. Soc. Engrs.—Jl., vol. 32, no. 5, June 1927, pp. 161–164. Brief history of its growth in United States.

America. Aviation in America, W. P. McCracken. West. Soc. Engrs.—Jl., vol 32, no. 5, June 1927, pp. 174–182. Review of present status; stresses need for airports.

Chicago. Air Transportation Needs in Chicago, P. G. Kemp. West. Soc. Engrs.—Jl., vol. 32, no. 5, June 1927, pp. 170–172 and (discussion) 172–174. Sets forth needs of air-transport service which can be contained in two subjects, namely, landing fields and business; commission recommends number of landing fields and terminal equipment, such as shops and hangars.

Flight Training. Flight Training of Student Naval Aviators, B. Studley. U. S. Nav. Inst.—Proc., vol. 53, no. 7, July 1927, pp. 764–773. Methods employed at Naval Air Station at Pensacola, Fla.; entire course of training, including advanced courses, requires approximately ten months.

Germany. Air Travel in Germany a Business Built on Practical Economics, E. J. Mehren. Am. Mach., vol. 67, no. 2, July 14, 1927, pp. 76a–76c. 74 air routes connect 55 cities daily.

High Altitudes. Advantages and Possibilities of Aerial Navigation at High Altitudes (Vantaggi e possibilita' della navigazione alle alte quote), N. Del Duca. Rivista Aeronautica, vol. 11, no. 12, Dec. 1926, pp. 9–24, 5 figs. Considers possibilities of flying with greater speed, safety, and mechanical efficiency at altitudes of, say, 16 or 17 kw.; special supercharged engines and breathing apparatus necessary for "superaviation."

Paris-Madagascar Flight. Paris-Madagascar Flight (Paris-Madagascar en avion). Aéronautique, vol. 9, no. 94, Mar. 1927, pp. 65–66. Captain Dagnaux of France has completed flight from Paris to Madagascar in Breguet airplane equipped with 550-lb. water-cooled Renault engine; account of trip is full of reports of difficulties, especially in landing and taking off.

Racing and Record Chasing. Airplane Racing and Record Chasing, F. W. Wead. U. S. Nav. Inst. —Proc., vol. 53, no. 7, July 1927, pp. 782–786. World's records and results.

Testing Air Pilots. The Ergoextensograph, an Apparatus for Testing the Muscular Sense of Candidates for Air Pilots (Un tipo di ergoestesiografo utilizzabile per valutare il senso muscolare dei candidati al pilotaggio), F. Ferrari-Lelli. Rivista Aeronautica, vol. 3, no. 1, Jan. 1927, pp. 33–40, 5 figs. Improved Galleotti instrument giving two graphical records, one for examiner and one for examined candidates.

Transatlantic. Technical Aspect of Lindbergh's Flight (L'aspect technique de l'exploit de Lindbergh), G. Lepere. Aérophile, vol. 35, no. 11–12, June 1–15, 1927, pp. 164–168. Discusses airplane and its equipment.

Transatlantic Flight in Seaplanes (Deux études d'hydraviation), Y. Jan-Kerguistel. Bul. Technique du Bureau Veritas, vol. 9, no. 3, Mar. 1927, pp. 49–55, 5 figs. Discusses flight from Marseilles to Algeria; aerodynamic study; possibility of crossing South Atlantic; comparison of two-engined and three-engined planes from commercial standpoint.

Transportation Costs. Economic Characteristics of Aerial Transportation (Caratteristiche economiche del trasporto aereo), E. G. Luraghi. Rivista Aeronautica, vol. 3, no. 5, May 1927, pp. 93–99, 2 figs. Comparative analysis of fixed charges and operating costs of transportation by air, rail, water; list of principal European air lines, showing saving in time of travel.

B

BALANCING MACHINES

Dynamic. Dynamic Balancing Machine. Engineering, vol. 124, no. 3207, July 1, 1927, pp. 25–26, 6 figs. Avery-Linley machine for balancing crankshaft dynamically.

BEARINGS

Anti-Friction. Requirements of Anti-Friction Bearings for High-Speed Use, D. E. Batesole. Am. Mach., vol. 66, no. 26, June 30, 1927, pp. 1075–1077, 10 figs. Retainer design for ball and cylindrical roller bearings; workmanship; mounting design features of grinding spindles, portable air-turbo grinder, and airplane superchargers; lubrication.

Oil Grooves in. Semi-Annular Grooves in Bearings Urged as Lubrication Aid, H. L. Newton. Automotive Industries, vol. 57, no. 2, July 9, 1927, pp. 54–56, 3 figs. High pressure in oil required when bearings are lubricated through radial hole in journal and outlet of hole registers with bearing groove for only small fraction of revolution.

Split, Machining. Machining Split Bearings, Machy. (Lond.), vol. 30, nos. 763 and 764, May 26, and June 2, 1927, pp. 244–246 and 265–268, 16 figs. May 26: Reviews machining methods which have come to notice, and outlines method writer has adopted to eliminate disadvantages of methods reviewed, and so increase production and obtain more accurate bearings at lower cost. June 2: Method and fixtures recommended.

BELT DRIVE

Short-Center. Solving the Problems of Short-Center Drives, W. Staniar. Indus. Mgmt. (N. Y.), vol. 74, no. 1, July 1927, pp. 15–20, 14 figs. Various means of securing efficient power transmission where space is limited.

BELTING

Textile, Calculation of. The Calculation of Textile Belts (Die Berechnung der Textilriemen), H. Krüger. Gummi-Zeitung, vol. 41, no. 24, Mar. 11, 1927, pp. 1343–1344, 2 figs. In author's opinion calculating tables for textile belts should be changed; these tables are based on 15 to 18-fold safety factor, whereas he believes that this coefficient should be at least 25, if indeed such tables are to be used at all.

BOILER FEEDWATER

Impurities. Impurities in Feed Water and Their Effect on Boiler Operation, J. B. Romer. Power, vol. 66, no. 1, July 5, 1927, pp. 32–33. Minerals in boiler water; effects of various minerals on boiler operation; corrosion. Abstract of paper read before Am. Water Works Assn.

Oxygen Recorder. An Instrument for Recording Dissolved Oxygen in Feed Water. Eng. & Boiler House Rev., vol. 40, no. 12, June 1927, pp. 621–624, 2 figs. Patent recorder is robust boiler-house instrument, which records percentage of oxygen on chart calibrated in cubic centimeters per liter of water, and thus enables defects in feedwater system to be instantly detected.

Treatment. Feed-Water Treatment. Elec. West, vol. 58, no. 6, May 15, 1927, pp. 389–392. Methods employed by Southern Pacific Co.; Mare Island navy yard; Great Western Power Co.; Pacific Gas & Electric Co.; Southern California Edison Co.; Long Beach steam plant; Los Angeles Gas & Electric Corp.; San Joaquin Light & Power Corp. Prime Movers' Committee report to Pac. Coast Elec. Engrs.

Feed Water for World's Largest Boilers Receives Zeolite and Acid Treatment. Power, vol. 66, no. 3, July 19, 1927, pp. 90–94, 5 figs. To prevent scale formation in boilers operating at 300 per cent rating when fed with 90 per cent make-up, zeolite softening was selected and followed by treatment of sulphuric acid, to reduce high caustic alkalinity in zeolite water.

BOILER FIRING

Oils and Gaseous Fuels. Burning of Liquid and Gaseous Fuels. Elec. West, vol. 58, no. 6, May 15, 1927, pp. 392–395, 1 fig. Water-cooled walls, and air preheaters and their effect upon combustion of oil and gas; comparison, from operating standpoint, of two different oil and gas burners; prevention of pulsation in operation of mechanical atomizing burners under natural draft. Prime Movers' Committee report to Pac. Coast Elec. Engrs.

BOILER FURNACES

Air Preheaters. Design of Air Preheaters (Lufterhitzerberechnung), Schlicke. Wärme, vol. 50, no. 14, Apr. 8, 1927, pp. 254–256, 4 figs. Presents formulas and curves showing conditions under which air heater operates, and facilitating its design; chart shows increase in boiler output which may be expected from use of air heating alone and in conjunction with balanced draft and forced draft respectively; in general, the lower the calorific value of fuel, the higher the desirable temperature of air.

Control. The Testing of Furnaces by Means of Control Clocks and Photography (Prüfung von Feuerungen mittels Kontrolluhr und Photographie), K. Bollinger. Archiv für Wärmewirtschaft, vol. 8, no. 5, May 1927, pp. 143–144, 2 figs. Testing of boiler-plant furnaces which are not automatically fired; modern measuring instruments and their deficiencies; control of combustion process in steam boilers by means of photography; description of new measuring instrument.

Developments. Recent Developments in Boiler Furnaces, B. N. Broido. Eng. Jl., vol. 10, no. 7, July 1927, pp. 333–344, 29 figs. Review of design of various types; stoker development; introduction of powdered fuel; water-cooled furnace walls; radiation in boiler furnaces; heat absorption by radiation; preheated air; difference in operation with and without water walls; insulation of water-cooled walls; air-cooled brick walls for furnaces; furnace control.

Fuel Atomizers. Improvements in Oil Combustion (Perfezionamenti nella combustione a petrolio). Rivista Marittima, vol. 60, no. 1, Jan. 1927, pp. 65–80, 11 figs. partly on supp. plates. Describes "Baulino" fuel atomizers imparting helicoidal rotation to emitted spray; results of tests on boilers of Italian Navy.

Gas Coke for. The Burning of Gas Coke in Boilers of Central Heating Plants (Die Verheizung von Gaskoks in Zentralheizungskesseln), Wolf. Archiv für Wärmewirtschaft, vol. 8, no. 6, June 1927, pp. 187–189, 9 figs. Results of tests made with gas and mine coke of different sizes; determination of losses through formation of CO_2.

Pulverized-Coal. Powdered Fuel Combustion and Furnace Design, T. A. McGee. Paper Trade Jl., vol. 84, no. 22, June 2, 1927, pp. 81–82. Selection of coal; percentage of fixed carbon; combustion rates and furnace volumes; increase in heat liberation; furnace-water cooling; four types of construction.

Pulverized Coal Furnace and Firing Problems, A. G. Christie. Power Plant Eng., vol. 31, no. 13, July 1, 1927, pp. 716–718. Unit pulverizer practice, turbulent burners, drying methods, furnace walls and ash-pit construction are matters for study.

Water-Cooled. Water-Cooled Furnaces, H. W. Leitch. Power, vol. 66, no. 4, July 28, 1927, pp. 129–132, 6 figs. First application with powdered fuel; absorption of radiant heat; side-wall temperature above ignition point.

BOILER OPERATION

Problems. Operation Problems Encountered in Boiler Operation at Omaha, C. F. Turner. Mech. Eng., vol. 49, no. 7, July 1927, p. 762. Deals with stoker drives, economizers, slagging, and sizing and tempering coal.

BOILER PLANTS

American Practice. American Boiler House Practice as Seen by a British Engineer. Eng. & Boiler House Rev., vol. 40, no. 12, June 1927, pp. 605–606. Impressions gained at American power plants; high and super-pressures; experimental work; mechanical stokers.

Automatic Control. Automatic Control in the Boiler House. Eng. & Boiler House Rev., vol. 41, no. 1, July 1927, pp. 15–22 and 40, 8 figs. Details of German installation of automatic control gear fitted to boilers of railway repair shops at Cassel. Translated from articles by Oberbeck in Wärme.

Instruments. Boiler Room Instruments, D. Herderson. Combustion, vol. 17, no. 1, July 1927, pp. 27–30. Deals with CO_2 recorder and flue-gas thermometer, flow meters, etc.

Instruments for Boiler Room and Turbine Room. Elec. West, vol. 58, no. 6, May 15, 1927, pp. 385–388, 9 figs. Comprehensive survey of instruments used by member companies; determination of those that have given complete satisfaction and of operating troubles and remedies applied. Prime Movers' Committee report to Pac. Coast Elec. Assn.

Railway Shops. New Plant Helps Reduce Railroad Costs. Power Plant Eng., vol. 31, no. 13, July 1, 1927, pp. 727–728, 4 figs. Simple, rugged coal, and ash-handling system installed with new boiler plant for railroad shops.

Steel Works. Recent Boiler Plant Installation at Edgar Thomson Works, Carnegie Steel Company, R. D. Abbiss. Iron & Steel Engr., vol. 4, no. 6, June 1927, pp. 285–296, 27 figs. Boilers are B. & W. Stirling, class no. 13, no. 40, twin units, arranged in single row in center of building.

BOILER PLATE

Embrittlement. Embrittlement of Boiler Plate, S. W. Parr and F. G. Straub. Indus. & Eng. Chem., vol. 19, no. 5, May 1927, pp. 620–622, 5 figs. Investigation undertaken by Engineering Experiment Station of University of Illinois in coöperation with group of public utilities of Middle West for purpose of obtaining information of general interest to all; cause of intercrystalline failures; prevention of embrittlement.

BOILERMAKING

Shops. Chesapeake and Ohio Boiler Shop at Huntington. Boiler Maker, vol. 28, no. 6, June 1927, pp. 156–162, 5 figs. New locomotive boiler shop designed with idea of centralizing departments and equipped to carry out major boiler construction and repairs for entire system.

BOILERS

Benson. The Siemens-Benson Critical Pressure Boiler. Engineer, vol. 143, no. 3728, June 24, 1927, pp. 690–691, 3 figs. Boiler is capable of maximum output of 22,000 lb. of steam per hour at 1420 lb. pressure and 756 deg. fahr. at stop valve; results of tests carried out during last 18 months.

Blowdown. Automatic Boiler Blowdown in Proportion to Moisture Content of Steam, W. J. Hughes. Power, vol. 66, no. 1, July 5, 1927, pp. 13–16, 5 figs. To maintain continuously proper relation between boiler-water condition and load, author proposes to use, in addition to steam purification, automatic boiler blowdown, in proportion to moisture in steam, at considerable saving over hand or continuous blowdown.

Drums. Forged Drums Promote Safety at High Pressure, J. L. Cox. Power Plant Eng., vol. 31, no. 14, July 15, 1927, pp. 771–774, 8 figs. Boiler drums forged without seams from single ingot give strength of walls equal to that of metal itself, and there is no limit to wall thickness, except as imposed by weight.

Drums, Testing. Testing High-Pressure Boiler Drums in Germany, J. Silberstein. Power, vol. 65, no. 26, June 28, 1927, p. 998. Firm of Thyssen & Co., Mühlheim-Ruhr, has developed process of making welded drums for working pressures of 800 to 1500 lb. per sq. in.; how testing is done.

Electric. Excess Energy and Electric Heat (Ueberschussenergie und Elektrowärme), O. Schwarzweber. Archiv für Wärmewirtschaft, vol. 8, no. 6, June 1927, pp. 175–179, 10 figs. Calculation of savings effected by installation of electric boilers; electric heat generation combined with hydroelectric plant, especially in Bavaria; steam engines and excess energy; gas engines and electric heat.

Electrically Welded Straps. Electrically Welded Reinforcing Straps on Boilers and Containers, E. Horn. Mech. Eng., vol. 49, no. 7, July 1927, pp. 731–734, 11 figs. Particulars regarding early investigations conducted in Switzerland, contributed by author as supplement to his article on autogenously and electrically welded boilers and containers, published in June 1926 issue of this journal.

Fusion Welding. Fusion Welding on Boilers and Pressure Vessels, F. W. Miller. Power, vol. 66, no. 3, July 19, 1927, p. 113. There are now being built tanks 7 ft. in diameter, 35 ft. long, of $^{15}/_{16}$-in. material for 200 lb. working pressure, based on design fiber stress of 9000 lb. per sq. in.; seams are all double V-welded with welding wire whose tensile strength as deposited in weld, is 65,000 lb. per sq. in., which has elongation on average of 15 per cent in 2 in.

Gasification and Combustion. Total Gasification and Combustion for Steam Boilers, D. Brownlie. Eng. & Boiler House Rev., vol. 41, no. 1, July 1927, pp. 23–27, 2 figs. Details of two methods for gasifying fuels and burning gases direct under boilers for even smallest units, that is, "Wollaston" process and "Gasifuel" process, latter being applicable also to "Lancashire" boilers.

High-Pressure Supplementary. High-Pressure Additions to Existing Boilers (Hochdruckdampferzeugung und Leistungssteigerung bei bestehenden Dampfkesselanlagen), H. F. Lichte. Wärme, vol. 50, no. 12, Mar. 25, 1927, pp. 213–218, 8 figs. Kröpelin system consists in providing additional heating surface, as near as possible to combustion chamber of main boiler; tubes used for this purpose are connected to high-pressure water and steam drums; old boiler may be used simply to heat feedwater for high-pressure boiler, or latter may supply high-pressure steam to back-pressure engine exhausting into same mains as are supplied by existing boiler; illustrates method of adding high-pressure supplementary boilers to Lancashire, water-tube, smoke-tube, and locomobile boilers; supplementary boilers are equally applicable to new and existing installations. See brief translated abstract in Power Engr., vol. 22, no. 255, June 1927, p. 233.

Mountings and Fittings. Modern Steam Boiler Mountings and Fittings. Eng. & Boiler House Rev., vol. 41, no. 1, July 1927, pp. 3–14, 15 figs. Review of some of principal mountings and fittings used in modern boiler practice.

Scale, Effect on Heat Transmission. What Scale Does to Boiler Heat Transmission Coefficients, H. O. Croft. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 33, no. 7, July 1927, pp. 435–439, 1 fig. Attempt to analyze boiler heat-transmission problem as a whole and to indicate relative importance of scale formation as one of constituent factors.

Scale Removal. Boiler Scale Prevention by an Entirely New Method. Eng. & Boiler House Rev., vol. 40, no. 12, June 1927, pp. 628–630. Process, known as "Etherium" scale-treatment method, consists of specially prepared compound, which is placed inside sealed metal canisters, and these canisters are placed in feedwater tank; peculiarity of this special compound is that although not in contact with water, it changes nature of solid content of water, both those in suspension and in solution, such change having effect of preventing solids from forming scale inside boiler.

Steam-Heating. The Code for the Rating of Low Pressure Solid Fuel Steam Heating Boilers. Am. Soc. Heat & Vent. Engrs.—Jl., vol. 33, no. 7, July 1927, pp. 440–441. Gives rating code, to give a measure of capacity, all other considerations being secondary; its purpose is to resolve present chaos in ratings of heating boilers.

Superheater Chambers. Calculations of Superheater Chambers for High Pressure and High Temperatures (Berechnung der Ueberhitzerkammern für hohen Druck und hohe Temperaturen), Siebel. Archiv für Wärmewirtschaft, vol. 8, no. 5, May 1927, pp. 139–141, 3 figs. Pressure tests on superheater chambers showed that at elevated pressures and temperatures formula given in code was no longer adequate; account of discussion on this subject at meeting of General Federation of German Steam-Boiler Inspection Societies in Zurich; reports on tests in Kaiser Wilhelm Iron-Research Institute, showing that Fischer's method was not practical; a simple approximate method was proposed which is said to give sufficient and accurate results.

Vertical Bent-Tube. A Step in Advance in Vertical Bent Tube Boiler Design, B. W. Bach. Universal Engr., vol. 45, no. 6, June 1927, pp. 23–25, 1 fig. Advantages of this boiler are: less head room and floor space per horsepower; less brick setting and maintenance per horsepower; absence of Dutch oven or flat arch extension to get good furnace volume; practically double amount of active heating surface exposed to radiant heat; staggered direct impingement on heating surfaces; cross flow of gas through tubes instead of gases flowing parallel with tube; absence of inactive gas pockets in boiler, etc.

Waste-Heat. Modern Waste Heat Boiler Developments, A. J. Ebner. Combustion, vol. 16, no. 6, June 1927, pp. 329–332, 4 figs. Development and requirements of waste-heat boilers; typical installation.

BOILERS, WATER-TUBE

Polish Sugar Mills. Water-Tube Boilers in Sugar Mills (Kotly optomkowe w cukrowni), K. Nowicki. Przeglad Techniczny, vol. 65, no. 9, Mar. 2, 1927, pp. 176–181. Operation and performance of types used in Polish sugar refineries.

Priming. Priming in Cross-Drum Water-Tube Boilers, A. Bement. Power, vol. 66, no. 2, July 12, 1927, pp. 56–57, 4 figs. Use of baffling in drum to eliminate tendency of cross-drum water-tube boiler at high rates of evaporation to discharge water with outgoing steam.

BORING MACHINES

Adjustable Horizontal. Barrett Adjustable Horizontal Boring Machine. Am. Mach., vol. 67, no. 1, July 7, 1927, p. 35. Bed is of box-type construction, deep and well ribbed; top surface is provided with longitudinal and cross T-slots.

Combination Three-Way. Rockford Combination Three-Way Boring Machine. Am. Mach., vol. 66, no. 26, June 30, 1927, p. 1110, 2 figs. Machine with two opposed horizontal heads and one vertical head.

BRICKMAKING

Machines. Modern Machines in Brickmaking Industry (Neuere Maschinen der Ziegelindustrie), E. Franck. V.D.I. Zeit., vol. 71, no. 23, June 4, 1927, pp. 823–826, 7 figs. Production methods; modern types of machines.

BRONZES

Machining. The Machining of Special Bronzes. Metal Industry (N. Y.), vol. 25, no. 6, June 1927, p. 249. Suggestions for working of different alloys.

Phono. Characteristics of Phono Bronzes. Am. Mach., vol. 67, no. 5, Aug. 4, 1927, p. 201. Phono bronzes are alloys, high in copper, containing small amounts of tin, approximately $1^1/_4$ per cent, and fluxed with silicon; their outstanding properties are in their ability to be hot-worked, and to be strengthened by cold work to high degree without losing their toughness or becoming brittle. Reference-book sheet.

C

CASE-HARDENING

Oil Fuel for. Oil Fuel for Carburizing, A. J. Smith. Petroleum Times, vol. 17, no. 441, June 25, 1927, pp. 1207–1208 and 1210. Results obtained in conjunction with continuous operation.

CASTING

Machine. Machining Casting with Lobe-Shaped Bore, J. E. Fenno. Machy. (N. Y.), vol. 33, no. 11, July 1927, pp. 818–820. Fixtures and tools designed for machining operations on exhaust-pump casings.

CASTINGS

Cleaning and Grinding. Cleaning and Grinding Casting. Iron Age, vol. 119, no. 26, June 30, 1927, pp. 1886–1889, 5 figs. Arrangement of tumbling barrels and their drive; gravity carries to grinding machines; methods at foundry for washing-machine factory of Maytag Co., Newton, Iowa.

CAST IRON

Heat Treatment, Effect of. Effect of Heat Treatment on the Combined Carbon in Gray Cast Iron, E. L. Roth. Am. Soc. Steel Treating—Trans., vol. 12, no. 1, July 1927, pp. 27–40, 13 figs. Results of series of experiments; heat treating is necessary when sufficient carbon has combined to form hard spots of cementite; microscopic examination shows that formation of graphitic carbon is propagated from edges toward center; it is believed that silicon does not have marked effect on graphitization; it is also shown that degree of graphitization does not increase with rising temperature.

Mechanical Cleaning. Means for Prevention of Defective and Production of Good Castings (Einiges über Mittel zur Vermeidung fehlerhafter sowie zur Erzielung guter Gussstücke), F. Brandenburg. Giesserei, vol. 14, no. 22, May 28, 1927, pp. 353–354, 4 figs. Describes two arrangements for mechanical cleaning of cast iron, which do not take place of deoxidation in ladle by aluminum but supplement this procedure.

Shrinkage. Some Aspects of Foundry Work, E. Longden. Foundry Trade Jl., vol. 35, nos. 563 and 564, June 2 and 9, 1927, pp. 463–465 and 475–480, 32 figs. Author's opinion is that liquid shrinkage in gray iron as is generally made evident by cavity and porosity is caused mainly by mold and occluded gases, but that there is also abundant evidence to prove that degree of resistance offered by mold material to gray iron when cooling has important bearing on solidity of metal; it would appear that actual metal shrinkage except in very strong iron, is practically nil; mold materials and density of castings; spherical castings; cause of mold disturbances; porosity of molding sand; running arrangements. June 9: Construction of mold; two grades of metal in same casting; making lathe bedplate; molding hydraulic cylinders, rams and heavy flywheels with special reference to molding-box construction; heavy flywheels; semi-permanent or long-life molds.

CHUCKING MACHINES

Automatic. Potter & Johnston 6-DP Platen-Type Automatic Chucking Machine. Am. Mach., vol. 66, no. 26, June 30, 1927, pp. 1106–1107. Adapted to wide range of chucking and between-centers work; it is capable of taking number of cuts simultaneously; one man can operate several machines. See also Machy. (N. Y.), vol. 33, no. 11, July 1927, pp. 873–874.

Carbonization. Low-Temperature Carbonization of Bituminous Coal, D. Brownlie. Engineering, vol. 124, no. 3208, July 8, 1927, pp. 36–38. Author gives list of what, in his opinion, are 50 most interesting and promising low-temperature processes as applied to bituminous coal only.

CHUCKS

Magnetic. Taft-Pierce "Superpower" Magnetic Chuck. Am. Mach., vol. 66, no. 25, June 23, 1927, pp. 1072–1073, 1 fig. Details of improved series.

COAL

Briquetting. Fuel Briquets, F. G. Tryon. U. S. Bur. of Mines—Mineral Resources, June 20, 1927, pp. 1–8. Production; number of plants in operation; capacity of plants, raw fuel, binders; plants operated in 1926; foreign trade in briquets; world's production.

By-Product Processing. The By-Product Processing of Coal. Mech. Eng., vol. 49, no. 7, July 1927, pp. 741–745. Discussion of three papers by A. C. Fieldner, Wm. H. Blauvelt, and R. S. McBride, published in Mid-November 1926 issue of this journal, dealing with fundamental technology of gaseous fuel supply, principles involved in high- and low-temperature coal-carbonization processes, possibilities of processes available, etc.

Carbonization. Low Temperature Carbonization in Holland, D. Brownlie. Gas Age-Rec., vol. 59, no. 25, June 18, 1927, pp. 889–890, 3 figs. Zuyderhoudt process consists essentially in use of battery of vertical, intermittent, externally heated, slightly conical, metal retorts having central perforated withdrawal pipe of comparatively large diameter in middle of charge, gaseous and volatile products evolved passing up through center of this pipe and out of top of retort.

Distillation. Low-Temperature Distillation of Coal (Notes sur la distillation à basse temperature du charbon). Revue de l'Industrie Minérale, no. 148, Feb. 15, 1927, pp. 75–88. General conditions of low-temperature distillation are defined, together with aims of process; history of subject is briefly outlined; physical characteristics of low-temperature tar; general classification of all known processes of low-temperature distillation and distinguishing features of number of processes. See brief translated abstract in Colliery Eng., vol. 4, no. 39, May 1927, p. 212.

Low-Temperature Distillation, W. Runge. Mech. Eng., vol. 49, no. 8, Aug. 1927, pp. 875–878. Discussion dealing with three typical processes of low-temperature distillation, calorific value of semi-coke produced, and price at which coke should sell, and including conservative estimate of production costs and profit.

Gasification. Gasification of Coal and Coke with Special References to Conditions in the Metallurgical Industry (Die Vergasung von Steinkohle und Koks unter besonderer Berücksichtigung der Verhältnisse in der Metallhüttenindustrie), E. Russ. Metall u. Erz, vol. 24, no. 9, May 1, 1927, pp. 205–215, 12 figs. Reviews principal types of generators and their heat economy, chemical composition and thermal properties of coal fuels; cost analysis shows that at great distance from coal mine higher grade coals are to be used.

Liquefaction. The Bergius Process of Coal Liquefaction, J. B. C. Kershaw. Colliery Eng., vol. 4, no. 39, May 1927, pp. 193–197, 8 figs. Account of plant operated at experimental works at Rheinau on Rhine River.

Liquefaction of Coal and Oil Synthesis (Kohlenverflüssigung und Oelsynthese). Brennstoff u. Wärmewirtschaft, vol. 9, no. 4, Feb. 2, 1927, pp. 87–91. Review of experiments and practical processes evolved by Bergius, Franz Fischer, and others.

Treatment. The Coal-Treatment Laboratory: Birmingham University. Engineering, vol. 123, no. 3206, June 24, 1927, pp. 753–755, 20 figs on supp. plates. Indication of work it is proposed to do in laboratory; deals with its general arrangement, and describes equipment, which is installed in it.

COAL DUST

Recovery from Briquetting Plants. The Economics of Fuel-Dust Recovery in Briquet Plants (Wirtschaftlichkeit der Brennstaubgewinnung in Briket fabriken), P. Rosin. Braunkohle, vol. 26, no. 4, Apr. 23, 1927, pp. 61–72, 3 figs. Discusses use of recovered coal dust in own plant or for marketing; gives cost analysis and proves advantages of selling coal in form of dry dust.

COAL HANDLING

Central Stations. Coal Handling at Dresser Station, H. M. Sharp. Power Plant Eng., vol. 31, no. 12, June 15, 1927, pp. 685–687, 3 figs. Equipment and methods of handling coal and ash at mine plant.

New Coal Handling System Enlarges Facilities, O. S. Richardson. Power Plant Eng., vol. 31, no. 14, July 15, 1927, pp. 791–793, 3 figs. New equipment at Eddy Street Station works with or independent of old system to meet demands of recent additions.

Industrial Plants. The Coal Handling and Storage Equipment of the Dye Works of Meister, Lucius and Brüning, at Höchst-on-the-Main (Die Kohlen-Förder- und Lageranlagen der Farbwerke vorm. Meister, Lucius & Brüning in Höchst a.M.), Buhle. Bautechnik, vol. 5, nos. 1 and 7, Jan. 1 and Feb. 11, 1927, pp. 7–9 and 87–90, 29 figs. Heavy electrically and otherwise operated loading, unloading, and conveying machinery, and structures along river front and railroad track.

COKE

Combustibility. The Combustibility of Coke, W. Diamond. Foundry Trade Jl., vol. 35, no. 562, May 26, 1927, pp. 448–450. Recovery coke ovens; structural strength of coke; cupola; volume and pressure of blast.

Statistics, 1924. Coke and By-Products in 1924, F. G. Tryon. U. S. Bur. Mines—Mineral Resources, no. II:31, May 20, 1927, pp. 591–728. Contains following contributions: Coke and By-products, F. G. Tryon and others; Marketing of Coal Products: A Discussion of Some Economic and Technical Principles Which Should Guide in the Disposal of the Primary Products of Coal Carbonization, R. S. McBride; statistical summary; production by furnace and non-furnace ovens; production by states and districts; number and type of ovens.

COKE-OVEN GAS

Decomposition. Decomposition of Coke-Oven Gas with Regard to Long-Distance Gas Supply (Die Zerlegung des Koksofengases mit Bezugnahme auf die Probleme der Ferngasversorgung), Borchardt. Gas- u. Wasserfach, vol. 70, no. 23, June 4, 1927, pp. 562–568, 5 figs. Review of various European processes of coke-oven gas decomposition and utilization; description of Linde process, for obtaining mixture of 75 per cent hydrogen and 25 per cent nitrogen, including arrangement of apparatus, chemistry, heat economy, and cost elements of process suggests utilizing residual gases of Linde process as fuel in form of "rich gas," for long-distance supply, and "poor gas" for heat decomposing plant itself.

COLD STORAGE

Fruit. Studies of the Optimum Cold Storage Temperatures for Fruit, E. L. Overholser. Ice & Refrigeration, vol. 73, no. 1, July 1927, pp. 26–29. Information on effect of temperature on various developments in fruits from picking through storage.

Handling Cost of Commodities. Handling Cost of Cold Storage Commodities, L. A. Bailey. Ice & Refrigeration, vol. 73, no. 1, July 1927, pp. 29–32. Advances reasons why consideration should be given to finding of four basic costs in operating cold-storage warehouse.

Plants. An Interesting Cold Storage Installation. Ice & Refrigeration, vol. 73, no. 1, July 1927, pp. 14–16, 8 figs. New plant of Diamond Cold Storage Co., Wilmington, Del.; modern equipment throughout, platforms conveniently arranged for quick and easy loading of railroad cars or trucks; details of piping and insulation and refrigerating equipment.

COMBUSTION

Control. Combustion Control from Operator's Viewpoint, W. C. Holmes. Combustion, vol. 17, no. 1, July 1927, pp. 36–39, 5 figs. Combustion control at Hudson Avenue station; control for 400-lb. boilers.

Experiences with Automatic Combustion Control, A. S. Davis. Combustion, vol. 17, no. 1, July 1927, pp. 33–36, 5 figs. As result of experience, it is felt that automatic control of primary air is not necessary; occasional adjustments of this air supply to proportion it to larger changes in load is all that is necessary, and automatic control of it would only result in increased complexity of apparatus without purpose.

Spontaneous. Spontaneous Combustion in North Staffordshire, T. D. Jones. Iron & Coal Trades Rev., vol. 114, no. 3090, May 20, 1927, pp. 818–819, 2 figs.; and discussion in no. 3091, May 27, p. 857. Influence of ventilating pressure and barometric change upon vitiation of air. See also Colliery Guardian, vol. 133, no. 3464, May 20, 1927, pp. 1169–1171, 2 figs.; and discussion in no. 3465, May 27, 1927, p. 1234.

COMPRESSED AIR

Economy over Steam. Economy in Using Air for Power, E. Blau. Iron Age, vol. 120, no. 3, July 21, 1927, pp. 131–134, 3 figs. Substitution of compressed air for steam in operation of hammers, presses and

shears; European users have gone far in making change to reduce their operating costs.

CONDENSERS, STEAM

Economical Design. Selecting the Most Economical Condenser, J. A. Powell and H. V. Vetlesen. Power Plant Eng., vol. 31, no. 12, June 15, 1927, pp. 672–673, 5 figs. Inlet temperature of circulating water, velocity of water in tubes, tube arrangement and design of condenser are details which must be considered when making study of best condenser to be used. Abstract of paper presented before Am. Soc. Mech. Engrs., Philadelphia.

Operation and Maintenance. Operation and Maintenance of Condensing Equipment. Elec. West, vol. 58, no. 6, May 15, 1927, pp. 379–384, 8 figs. Analyzes problems of condenser operation, particularly those over which operator has control to certain extent, such as operation of circulating pumps, cleaning of tubes and prevention and location of air and tube leaks. Prime Movers' Committee report to Pac. Coast Elec. Assn.

Performance. Steam Condenser Performance, D. G. McNair. Colliery Eng., vol. 4, no. 39, May 1927, pp. 198–200, 3 figs. Effects of changing conditions on vacuum obtained in steam condensers.

CONNECTING RODS

Automobile Engines. Connecting-Rod Methods of the Marmon "8," F. H. Colvin. Am. Mach., vol. 67, no. 2, July 14, 1927, pp. 61–63, 6 figs. Special fixtures that permit almost continuous milling; elongating hole before sawing off cap; electrically controlled babbitting furnace; milling face joints on cap and rod.

Manufacture. Connecting Rod Manufacturing Methods, A. F. Denham. Automotive Industries, vol. 57, no. 2, July 9, 1927, pp. 41–45. Much variation in methods used by important car makers despite standardization of some phases of process.

CONVEYORS

Foundries. Savings from the Use of Conveyors in Manufacturing. Iron Age, vol. 120, no. 1, July 7, 1927, pp. 1–5, 8 figs. At new Maytag continuous foundry and its manufacturing department conveyors of many types were incorporated in whole; overhead tramways carry hot metal to pour castings and carry partly assembled parts to place where they go together in making complete washing machine; belt conveyors carry sand and coke to place of use; roller conveyors are used for castings going to and through grinding and polishing department; wheeled trucks or carts handle cupola charges, gather scrap from manufacturing operations and feed new sand to system as needed.

Pneumatic. The "Pneuconex" Pneumatic Conveyor System. Machy. Market, no. 1388, June 10, 1927, pp. 21–23, 4 figs. System includes special section of piping, tangential method of introducing material, self-closing collecting nozzles, special bends and junctions, controlling valves, automatic gravity-operated dischargers, new type of rotary exhauster.

Progressive Production. Handling Devices and Progressive Manufacturing Processes, Wolther. Indus. Mgmt. (Lond.), vol. 14, no. 6, June 1927, pp. 197–201, 10 figs. Handling devices employed in progressive-production processes. Translated from Fördertechnische Rundschau.

Wood Shavings. Design of Conveyors for Wood Shavings (Die Berechnung der Spänetransport-Anlagen), S. Grakhan. Fördertechnik u. Frachtverkehr, vol. 19, no. 4, Feb. 18, 1927, pp. 92–95. Criticizes existing methods and presents principles of design of pneumatic conveyors with special reference to transportation of wood shavings; practical numerical example.

COOLING TOWERS

River Water vs. River Water versus Cooling Towers (Le choix entre l'eau de rivière et les réfrigérants de condensation pour les centrales thermiques), T. J. Gueritte. Génie Civil, vol. 90, no. 15, Apr. 9, 1927, pp. 366–367. Summarizes reasons for using cooling towers for condensing water instead of drawing continual fresh supply of water from river; recent advances in construction of cooling towers; circular form is most efficient, and large towers are more economical than small ones; tower of 130 ft. diameter gives same service as four towers of 65 ft. diameter and costs much less; difficulty of securing uniform air flow across whole cross-section of large cylindrical towers has led to development of hyperbolic towers. See brief translated abstract in Power Engr., vol. 22, no. 255, June 1927, p. 234.

CORROSION

Causes and Prevention. Corrosion, Its Causes and Prevention, C. E. Texter. Power, vol. 66, no. 1, July 5, 1927, pp. 33–34. Theory of corrosion; factors that are becoming more severe; boiler-water treatment. Abstract from paper presented at Nat. Board of Boiler and Pressure Vessel Inspectors.

COST ACCOUNTING

Working Hours and Overhead. Working Hours and Oncosts, A. Whitehead. Machy. (Lond.), vol. 30, no. 765, June 9, 1927, pp. 293–295, 2 figs. Effects of fatigue and of time of starting on work; variations in cost under different working conditions; unit cost variation in relation to hours worked; advantages and disadvantages of night shift.

CRANES

Accidents. Mechanical Causes of Crane Accidents, M. C. Goodspeed. Safety Eng., vol. 53, no. 6, June 1927, pp. 253–255. Calls attention to outstanding parts of crane which frequently fail.

Gantry-Cable. Gantry-Cable Cranes for Storeyards (Brückenkabelkrane für Lagerplatzbedienung), K. Zapf. Fördertechnik u. Frachtverkehr, vol. 20, no. 1, Jan. 7, 1927, pp. 8–9, 3 figs. Recent European gantry cranes with grab traveling along cable suspended from ends of gantry.

Shaft Bearings. Shaft Bearings in Crane Construction (Wälzlager im Kranbau), Müller. Fördertechnik u. Frachtverkehr, vol. 20, no. 12, June 10, 1927, pp. 216–218, 11 figs. Discusses shaft bearings for traversing wheels, cable sheaves, load barrels, hooks, etc., with special reference to mode of assembling of bearing parts.

CRANKSHAFTS

Aircraft Engines. Accidental Fractures of Crankshafts of Aircraft Engines and the Best Means of Preventing Them (Sulle fratture accidentali degli alberi a gomito di motori d'aviazione e sui mezzi migliori per prevenirle), G. Montelucci. Rivista Aeronautica, vol. 11, no. 12, Dec. 1926, pp. 47–60, 12 figs. Metallographic study of European and American cases; recommends purest possible nickel-chrome steel, cold working of metal, final heat treatment to be very precisely regulated, and judicious lightening of finished crankshaft.

Beveling Cheeks. Beveling Crankshaft Cheeks. Machy. (N. Y.), vol. 33, no. 12, Aug. 1927, pp. 907–908, 4 figs. All eight cheeks on Dodge four-cylinder automobile crankshafts are beveled simultaneously at outer ends in standard "Lo-swing" lathe manufactured by Seneca Falls Machine Co.

Built-Up. An Interesting Crankshaft. Automobile Engr., vol. 17, no. 229, June 1927, pp. 225–226, 2 figs. Novel constructional methods on component designed by A. C. (Acedes) Cars; each web is disk with journal or pin forged integral with it; there are 12 such disks, that at forward end carrying spigot for supercharger drive, while rear one carries taper for attachment of flywheel.

CUTTING METALS

Under Water. Cutting Metals Under-Water, L. F. Hagglund. Am. Welding Soc.—Jl., vol. 6, no. 5, May 1927, pp. 51–54, 5 figs. Method of cutting by means of electric arc and oxygen; combines heat of electric arc, together with oxidizing effect of stream of gaseous oxygen; method has been used successfully at various depths down to 120 ft. to cut steel plate, sheet piling, cast steel, cast iron, copper and brass.

D

DIE CASTING

Aluminum. Notes on Aluminum Die-Casting, F. A. Livermore. Metal Industry (Lond.), vol. 30, no. 23, June 10, 1927, pp. 571–572. Die-casting machines; dies, alloys; method of die casting.

Purchasing. What to Know in Buying Die Castings, C. Pack. Iron Age, vol. 120, no. 3, July 21, 1927, pp. 140–141. First cost is not all-important element, considering that poor die will not give satisfactory results in user's product.

DIES

Laminations, Manufacture of. Dies for Producing Laminations, P. J. Edmonds. Machy. (N. Y.), vol. 33, nos. 10 and 11, June and July, 1927, pp. 749–754 and 829–832, 10 figs. Design, construction, and application of dies for manufacturing laminations used in electrical apparatus.

DIESEL ENGINES

Acro. The Acro Diesel Engine, R. Stribeck. Engineering, vol. 123, nos. 3204 and 3206, June 10 and June 24, 1927, pp. 699–701 and 779–781, 13 figs. Essential characteristic of engine is peculiar compression space consisting of three separate parts, design of which and its subdivision was developed by inventor, F. Lang; results of tests; exceedingly difficult problem of mixing fuel with air is practically non-existant in case of this engine, and mixture is formed quite incidentally in course of combustion. Translated from German.

Automotive. Development of the High-Speed Diesel Engine, P. M. Heldt. Soc. Automotive Engrs.—Jl., vol. 21, no. 1, July 1927, pp. 87–98, 18 figs. Original definition of four-stroke Diesel engine; history of high-speed Diesel-engine development which includes mention of main features of following engines: Junkers, Attendu, Sperry, Beardmore, Hindlmeier, Lang, Benz, M.A.N., Maybach, Peugeot, and others; engineering problems relating to Diesel engines for automotive use; summary of advantages and disadvantages of Diesel engine for automotive purposes by W. C. Wall.

Diesel Motors for Automobiles, H. Triebnigg. Oil Eng. & Technology, vol. 8, no. 6, June 1927, pp. 224–225. Outstanding advantage of Diesel as automotive machine is mainly in possibility of fuel economy, by employment as fuel of gas oil, brown-coal tar oil, and the like, instead of much more expensive gasoline and benzol; question to consider is whether crude-oil engine and, particularly, Diesel engine is already so far developed and perfected as to be serious rival of automobile engine using gasoline or benzol as fuel; names engines of Diesel automotive type which have shown practical results. Abstracted from Technische Blätter, May 28, 1927.

Cost and Test Data. Oil Engine Cost and Test Data. Power Plant Eng., vol. 31, no. 12, June 15, 1927, pp. 675–677, 3 figs. Installation costs and operating data of Diesel and semi-Diesel engines.

Costs. Diesel and Semi-Diesel Engine Costs, E. R. Mellenger. Can. Engr., vol. 52, no. 23, June 7, 1927, pp. 579–581, 2 figs. Comparison between initial and operating costs of Diesel and semi-Diesel engines; comparative costs of fuel for oil, gas, and steam engines; heat recovery on Diesel engines; exhaust-gas turbine.

Fuel Regulation. An Apparatus for Fuel Regulation in Diesel-Engine Cylinders (Dispositive "Baulino" per la regolazione del combustibile nei cilindri dei motori Diesel). Rivista Marittima, vol. 59, no. 12, Dec. 1926, pp. 1006–1018, 4 figs. partly on supp. plates. Drawings and description of Italian patented invention for quick regulation of fuel-injection pumps, which is being installed in all Italian submarines; modes of operation; tests of sensitiveness and fuel consumption per hour.

Injection Cams. Design and Calculation of Injection Cams and Fuel Valves of Diesel Engines (Beiträge zum Entwurf und zur Berechnung der Brennstoffnocken und Brennstoffventile von Dieselmotoren), J. N. Basu. Motorwagen, vol. 30, no. 13, May 10, 1927, pp. 285–295, 19 figs. Shows how by studies of diagrams and by gradual modification of injection cam, almost ideal combustion with reasonable maximum pressures can be attained; such study is, however, very time-consuming for any one engine and author gives certain diagrams by means of which he thinks that correct cam can be designed at outset.

Inspection and Upkeep. Instructions and Recommendations for the Inspection and Upkeep of Diesel Engines (Instructions et recommandations concernant la visite et l'entretien des moteurs Diesel). Bul. Technique du Bureau Veritas, vol. 9, no. 2, Feb. 1927, pp. 21–25. Urges particularly severe inspection of ships with heavy oil engines; analysis of causes for most frequent damages in order to detect those which originate from lack of upkeep.

Light Supercharged. The Light Supercharged Diesel Engine for Use in Air Service, E. A. Sperry. Mech. Eng., vol. 49, no. 7, July 1927, pp. 723–726. Particulars of author's proposal to reduce Diesel-engine weight per horsepower below that of gasoline engines by employment of high supercharging, and to eliminate fire risk from flying by use of Diesel engines running on cheap, low-volatile fuel oil.

Nelseco. The New Nelseco Diesel Engine. Pac. Mar. Rev., vol. 24, no. 6, June 1927, pp. 270–271, 2 figs. Mechanical-injection Diesel-electric power plants great success in New York Harbor tugs and New York-Weehauken ferryboats.

Solid-Injection. Operating a Solid-Injection Diesel, J. Skeoch. Power, vol. 66, no. 4, July 28, 1927, p. 128. Discusses problems peculiar to this type of engine.

Wolf. Well Known German Oil Engine Enters American Field. Oil Engine Power, vol. 5, no. 7, July 1, 1927, pp. 478–479, 2 figs. Two-cycle solid-injection engine of unusual simplicity, produced by R. Wolf A. G., of Madgeburg; it employs no pre-combustion chamber, fuel being injected into conical combustion chamber which opens directly into cylinder.

DRILLING MACHINES

Combined Measuring and. Société Génevoise Combined Measuring and Drilling Machine. Am. Mach., vol. 66, no. 26, June 30, 1927, p. 1112. Machine that combines means for accurate measurement with facilities for drilling and boring of holes in master plates or parts of small machines and instruments.

Gang. Barnes No. 210 All-Geared Gang Drill. Am. Mach., vol. 66, no. 26, June 30, 1927, pp. 1105–1106. For single-purpose production work where frequent changes of speeds are not necessary. See also Iron Age, vol. 119, no. 26, June 30, 1927, pp. 1894–1895, 1 fig.

Multiple-Spindle. "Footburt" Multiple-Spindl Drill. Machy. (N. Y.), vol. 33, no. 12, Aug. 1927, pp. 955–956, 1 fig. Equipped with flanged sliding unit to which different multiple heads may be bolted for various jobs; in changing from one job to another, it is merely necessary to change heads to adapt machine for new job, and this may be quickly done.

DURALUMIN

Corrosion. Effect of Corrosion upon the Fatigue Resistance of Thin Duralumin, R. R. Moore. Am. Soc. Testing Matls.—Advance Paper, no. 37, for mtg. June 20–24, 1927, 7 pp., 5 figs. Results of fatigue tests on thin-gage corroded duralumin to determine effect of embrittlement of duralumin, due to corrosion, in terms of resistance of metal to repeated stresses or fatigue; results show effect of certain degree of corrosion upon endurance limit; corrosion of duralumin occurs predominantly along grain boundaries ("intercrystallin") and is of continuous or progressive nature rather than local pitting type, although some of latter is present; method of making accurate fatigue tests on thin-gage light metals.

Spot-Welded. Tension Tests of Spot-Welded Duralumin, T. W. Downes. Chem. & Met. Eng., vol. 34, no. 6, June 1927, pp. 359–360, 4 figs. Deals principally with tension and corrosion tests of electric spot welded specimens of sheet duralumin which have been conducted at Naval Aircraft Factory; heat treatment of specimens; character of welds.

DYNAMOMETERS

Drawbar. An Inexpensive Drawbar Dynamometer, E. C. Sauve. Agric. Eng., vol. 8, no. 6, June 1927, pp. 145–147, 3 figs. Dynamometer and recorder developed by author.

E

EDUCATION, ENGINEERING

Trends. Trends in Engineering Education, A. A. Potter. Ry. Mech. Engr., vol. 101, no. 7, July 1927, pp. 427–428. Engineering as it affects national prosperity; industry and engineering colleges are

interdependent; engineering education in the United States and Canada.

EDUCATION, INDUSTRIAL

College Graduates. Industrial Training for College Graduates, S. C. Coler. Soc. Indus. Engrs.—Bul., vol. 9, no. 5–6, May-June 1927, pp. 25–26. General aspects of industrial training program; Westinghouse program.

Requirements. Education for the Industries, P. F. Walker. Mech. Eng., vol. 49, no. 8, Aug. 1927, pp. 889–892 and (discussion) 892. Specialized requirements that must be met; need for general education of public as to economic basis of industry, more complete and thorough job training, and education for industrial leadership.

ELECTRIC WELDING, ARC

Gears. Making Gears by Arc Welding. Welding Engr., vol. 12, no. 6, June 1927, pp. 39–42, 6 figs. Radical change in appearance is only an incident in change from cast gear blanks to gear blanks made of welded steel; more important features of two types of gears are compared.

Plates and Structural Shapes. Welded Parts Take the Place of Castings, C. O. Herb. Machy. (N. Y.), vol. 33, no. 11, July 1927, pp. 861–865, 9 figs. Fabrication of plates and structural shapes into machine members by arc welding.

Structural Steel. The Welding of Steel Structure. Machy. (N. Y.), vol. 33, no. 11, July 1927, pp. 825–827, 3 figs. Design, fabrication, erection, and cost of five-story shop, 70 ft. wide, 220 ft. long. Abstract of paper read before Am. Iron & Steel Inst.

Tank Construction. Arc Welding Speeds in Tank Construction, R. E. Kinkead. Boiler Maker, vol. 28, no. 6, June 1927, p. 177, 3 figs. Use of proper electrodes at higher heats for any given work accomplishes gain in speed of manual operation.

ELECTRIC WELDING, RESISTANCE

Seam. Seam Welding, W. H. Gibb. Am. Welding Soc.—Jl., vol. 6, no. 5, May 1927, pp. 55–64, 16 figs. Term "seam welding" is applied to that process of resistance welding by which overlapped edges of two pieces of sheet metal are joined in continuous weld, without addition of any other metal; advantages of process.

Truck Wheels. Resistance Welding Truck Wheels, W. Remington. Am. Welding Soc.—Jl., vol. 6, no. 5, May 1927, pp. 64–73, 10 figs. Welding of Bethlehem rolled-steel truck wheel.

ELEVATORS

Control. How a Variable-Voltage System Elevator Control Operates, C. A. Armstrong. Power, vol. 66, no. 2, July 12, 1927, pp. 46–50, 4 figs. Earlier types of variable-voltage control as applied to elevators had serious objection of poor speed regulation; that is, speed of car for given controller point varied through wide ranges with load; in modern variable-voltage control systems this difficulty has been overcome by special compounding of generator, by series exciter system or by introducing special features in control system that automatically cut resistance into and out of generator-field circuit to assist in holding speed of motor nearly constant.

EMPLOYEES

Selection and Training. The Right Man for the Job, U. J. Lupien. Factory, vol. 38, no. 6, June 1927, pp. 1082–1084, 1208, 1210 and 1212, 3 figs. Selecting, training and reëducating workers.

EMPLOYMENT MANAGEMENT

White Motor Company. Sound Management in Dealing with Men, C. O. Herb. Machy. (N. Y.), vol. 33, no. 12, Aug. 1927, pp. 885–889, 10 figs. Steady employment, good wages, good working conditions and opportunities for self-expression, are four cornerstones on which White Motor Co., Cleveland, Ohio, has built loyal organization; average monthly labor turnover has been reduced to only 3 per cent, which is stated to be lowest turnover of any industrial concern in Cleveland.

F

FACTORIES

Building Design. Which Shall That New Factory Be—Single or Multi-Story? M. Kahn. Factory, vol. 38, no. 6, June 1927, pp. 1096–1097, 6 figs. Practical points to be considered in making decision, as seen by architects who have designed some of best-known plants in America, including those of Ford Motor Co.

Buildings. Umbrella-Type Factory Building. Engineering, vol. 124, no. 3207, July 1927, p. 13, 7 figs. Steel roof work is of cantilever or umbrella type.

FARM MACHINERY

Chaff and Fodder Cutting. A Novel Chaff and Fodder Cutting Machine, J. Uebbing. Eng. Progress, vol. 8, no. 5, May 1927, pp. 133–134, 5 figs. Universal pneumatic machine has capacity of 60 and more tons daily and is capable of pneumatically conveying cut fodder to conservation store, either by means of blade-wheel blower or, if required by construction of conservation plant, by long-distance blower.

Developments. The Application of Machinery to Agriculture, O. B. Zimmerman. Mech. Eng., vol. 49, no. 8, Aug. 1927, pp. 845–849, 9 figs. Outline of problems involved in mechanization of agriculture.

Harvesters. Krupp Harvesters for Grain, Grass and Hay (Krupp-Erntemaschinen für Getreide, Gras und Heu), E. Lehmkühler. Kruppsche Monatshefte, vol. 8, May 1927, pp. 83–87, 9 figs. Details of modern types produced by German firm.

Hay Stackers. German Hay Stackers (Höhenförderer in der deutschen Landwirtschaft), W. Elsner. Fördertechnik u. Frachtverkehr, vol. 20, no. 3, Feb. 4, 1927, pp. 60–65, 19 figs. Deals principally with portable hay stackers and loading machinery, including traveling fork grabs, hooks, cranes, platforms, blowers, etc.

FATIGUE

Industrial. Annual Report of the Committee on Elimination of Unnecessary Fatigue, G. H. Shepard. Soc. Indus. Engrs.—Bul., vol. 9, no. 5–6, May-June 1927, pp. 27–29. Results of research.

FIRE ENGINES

Turbine-Pump-Motor. 80 H.P. Turbine Pump Motor Fire Engine. Engineer, vol. 143, no. 3726, June 10, 1927, p. 638, 1 fig. Constructed by Merryweather & Sons; equipped with 6-cylinder engine; fire pump which is carried at rear is Merryweather turbine of new design having 2 stages and is made throughout of gunmetal.

FIRE PREVENTION

Coal-Dust Bunkers. Preventing Fires in Coal-Dust Bunkers (Verhütung von Kohlenstaubbunkerbränden), H. Müller. Braunkohle, vol. 25, no. 40, Jan. 1, 1927, pp. 906–908. Tells what to do in case of fire and gives set of precautionary rules.

FLOUR MILLS

Fire Protection. Protection of Flour Mills and Grain Elevators Against Fire and Explosion, F. J. Hoxie. Mech. Eng., vol. 49, no. 8, Aug. 1927, pp. 879–884 and (discussion) 884–885, 6 figs. As common methods of automatic protection are powerless, new methods must be devised; laboratory experiments, as well as study of recent large elevator explosions, demonstrate that grain-dust explosions are slow compared with those of gasoline or gunpowder, therefore they may be relieved by automatically opening windows or shutters, provided that latter open easily and have sufficient area compared with volume to room to be protected; fine particles which cause most rapid explosions can be removed from atmosphere where they originate and thereby be prevented from accumulating over period of years on inside of elevator enclosures and pulleys, and in other out-of-the-way places; with air suction on all of conveying apparatus and enclosures in which fine dust is formed, self-opening shutters or windows throughout, together with modern concrete construction, closed-top tanks with automatic vents, well-vented basements, and other safety appliances now being introduced, grain elevator or cereal mill can be made as safe as cotton factories with automatic sprinklers.

FLOW OF AIR

Static-Pressure Measurement. Measurement of Static Pressure, C. J. Fecheimer. Mech. Eng., vol. 49, no. 8, Aug. 1927, pp. 871–873 and (discussion) 873–874, 10 figs. Describes new instrument for measuring static pressures in air-flow determinations; it is easily introduced into air ducts through small openings, such as bolt holes pressure is communicated to manometers through two holes, one to inner tube and other to concentric space between tubes, about 78.5 deg. apart; instrument has less error in turbulent flow than other types.

FLOW OF FLUIDS.

Pipes. Calculation of Fluid Friction in Pipes, A. J. Nicholas. Power, vol. 66, no. 2, July 12, 1927, p. 60, 1 fig. Wherever liquids flow in pipes this method is usable; liquid may be water, oil, or any other fluid, liquid or gaseous; pipe may be full or partly filled and its surface may be smooth or rough.

FLOW OF GASES

Pipes. Discussion of Pipe Line Flow Formulae, E. L. Rawlins. Natural Gas, vol. 8, no. 6, June 1927, pp. 8–11 and 15. Investigation of flow of natural gas through high-pressure natural-gas transmission lines to secure accurate information that will help operators in designing their pipe lines and determining capacity effects under different operating conditions in order to secure more efficient operation.

Resistance to Gas Flow in Wrought-Iron Pipes (Fortleitungswiderstand in Gasrohrleitungen), R. Biel. Gas- u. Wasserfach, vol. 70, no. 23, June 4, 1927, pp. 547–554, 6 figs. Reviews existing formulas and develops original practical formula which checks recent experiments; contains tabulation of American and European experimental work, particularly 1924 and 1925 experiments of German Gas Institute, also diagram for solution of gas-pipe problems by means of formula derived.

FLOW OF WATER

Conduits. The Estimation of Velocities in Water Conduits. Engineering, vol. 124, no. 3210, July 22, 1927. Presents chart prepared by E. H. Essex for making rapid estimate of velocity of flow in water pipe or in open channel.

FLUE-GAS ANALYSIS

Calculation. Flue Gas Analysis, C. C. Krausse. Am. Gas Jl., vol. 126, no. 25, June 18, 1927, pp. 599–603, 2 figs. Manipulation of apparatus and calculations.

CO_2 Recorders. CO_2 Recorders on Oil Burning Boilers, W. H. Stoetzel. Combustion, vol. 17, no. 1, July 1927, pp. 41–42, 1 fig. Demonstrates value of CO_2 recorders.

A Motor Driven CO_2 Recorder. Eng. & Boiler House Rev., vol. 4, no. 1, July 1927, pp. 27–30, 4 figs. Recorder which requires no water supply, extracting gear consisting of small electric motor and pump; this design has been put on market by Electroflo Meters Co.

Testers. Flue-Gas Testers and Recorders (Prüfer und Zähler für Rauchgas), W. Ahrens. Archiv fur Wärmewirtschaft, vol. 8, no. 6, June 1927, pp. 183–185, 6 figs. New testing and measuring apparatus of Siemens & Halske; importance of measurement of combustible constituents in flue gases, especially in metallurgical works; influence of flue-gas control on efficiency of steam boilers; electrolytic recorders for indication of mean CO_2 and CO content.

FLUE GASES

Control. Flue Gases and Their Direct Relation to Combustion Efficiency, A. Seton. Eng. & Boiler House Rev., vol. 40, no. 12, June 1927, pp. 610–613. Ideal flue gas consists of nitrogen, CO_2 and minimum quantity of oxygen; by suitable regulation of air supply, CO_2 content can be maintained at approximately 10 to 14 per cent; oxygen should not be more than 8 to 9 per cent and there should be no CO.

FLYING BOATS

Rohrbach Rocco. The Rohrbach Rocco (Das neue Rohrbach-Verkehrs-Flugboot "Rocco"), H. Witte. Motorwagen, vol. 30, no. 13, May 10, 1927, pp. 300–302. Twin-engined flying boat with two Rolls-Royce engines of 650 hp. each; each driving four-bladed propeller and arranged under wings side by side; wings are monoplane with two outside struts; stabilizing floats are under wings; machine is made entirely of metal; it is intended for German Luft Hansa and will be used for service between Germany and England. See also description in Aviation, vol. 22, no. 25, June 20, 1927, pp. 1372–1374.

FLYWHEELS

Centrifugal Stresses. Centrifugal Stresses in Flywheels, P. F. Foster. Machy. (Lond.), vol. 30, no. 765, June 9, 1927, 301–304, 3 figs. Compares results obtained by cruder methods of calculation so largely employed as checks in design; only effects of centrifugal force are dealt with.

FOREMEN

Conference Groups. Workers' Coöperation Lowers Costs, E. R. Cole. Mfg. Industries, vol. 14, no. 1, July 1927, pp. 27–30, 2 figs. Acheson Graphite foremen's conference achieves remarkable results; superintendent meets with foremen's conference group and presides over its sessions; meetings are held whenever necessary and last until business is cleaned up.

Training. Industrial Problems or Difficulties, L. A. Hartley. Mech. Eng., vol. 49, no. 8, Aug. 1927, pp. 893–896 and (discussion) 896–897. Discusses subject of foremen training in experimental or textbook stage, and shows progress that is being made in attempts to arrive at more satisfactory method; three common errors are discussed, namely error of ignoring specific problems, error of analysis without synthesis, and error of over-emphasizing foreman's teaching.

FOUNDING

Heroic Statuary. Making Heroic Statuary, P. Dwyer. Foundry, vol. 55, no. 11, June 1, 1927, pp. 418–422 and 432, 7 figs. Points out that technique employed in molding and casting statuary and other objects of art either in base or precious metal has changed but little since biblical times, with single exception that one man's work is divided among many; practice of bronze founding of Gorham Co., Providence, R. I.

FOUNDRIES

Direct Metal Process in. Using Direct Metal in Foundry. Iron Age, vol. 119, no. 26, June 30, 1927, pp. 1869–1872. Blast-furnace iron and cupola iron mixed in Ford plant to obtain desired analysis; electric furnace controls temperature.

Costing. Scientific Costing, J. W. Kearsey. Foundry Trade Jl., vol. 35, no. 565, June 16, 1927, p. 506. Determination of foundry costs can be handled much more satisfactorily by technical man than by an accountant, provided that he is conversant with fundamentals of costing and fully understands general basis on which he must work; principle of predetermination of costs must be definitely accepted; costs must be analyzed into factors and controlled by standards; orthodox methods unsuitable.

Farm Implements. Massey-Harris Makers of Implement History, E. G. Brock. Can. Foundryman, vol. 18, no. 6, June 1927, pp. 10–14, 8 figs. With huge foundry making use of all modern devices, Toronto plant, conceived on Ontario farm, produces quality parts in huge quantities; 250 molders in room 980 by 90 ft. in size.

Purchasing. The Purchasing of Pig Iron and Other Foundry Material (Die rechnerische Ermittelung der günstigsten Bestellmenge von Roh- und Hilfsstoffen in der Giesserei), S. Prohaczka. Giesserei, vol. 14, no. 21, May 21, 1927, pp. 339–341, 2 figs. Numerical determination of amount to be purchased with regard to cost of handling and storage.

Small. What Is Wrong with the Small Foundry; P. Dwyer. Indus. Mgmt. (N. Y.), vol. 74, no. 1, July 1927, pp. 33–39. Small foundry occupies well-defined and necessary place in industrial field, but field is highly competitive; it is no longer rule-of-thumb, hit-or-miss proposition; it is highly intricate, highly involved and highly specialized business.

Time Study. Time Studies in the Foundry (Zeitstudien in der Giesserei), H. Tillman. Giesserei-Zeit., vol. 24, no. 6, Mar. 15, 1927, pp. 145–150, 4 figs. Points out necessity for time studies; practical application of investigating results.

Washing Machines. Builds Continuous Shop, H. M. Lane. Foundry, vol. 55, no. 12, June 15, 1927, pp. 481–485, 8 figs. Methods and equipment

of Maytag Co., Newton, Ia., in production of washing machines.

FOUNDRY EQUIPMENT

Sand Mixers. Sand Mixer for Use in Continuous Handling Systems. Iron Age, vol. 120, no. 2, July 14, 1927, p. 83. Capacity ranging from 60 to 85 tons of sand per hour is claimed for Simpson intensive sand mixer.

FUEL ECONOMY

Advances in. New Advances in Heat Economy, K. A. Hartung. Combustion, vol. 16, no. 6, June 1927, pp. 332–333. New methods and apparatus; tendency has been toward determination of oxygen content, procedure which gives constant results; types of meters and automatic regulation apparatus. Translated from paper read before Soc. German Chemists.

Possibilities. Possibilities of Fuel Economy, H. A. Brassert. Iron Age, vol. 120, no. 2, July 14, 1927, pp. 77–78. Suggests improvements in iron and steel industry; Germans lead in heat-saving refinements; gas enrichment proposed. Abstract of paper read before Eastern States Blast Furnace and Coke Oven Assn.

FURNACES, ANNEALING

Continuous. Continuous Furnace Used to Anneal Steel Castings. Iron Age, vol. 119, no. 26, June 30, 1927, p. 1897. Annealing period reduced as much as 2 hr. by rotary-type oven at Detroit plant.

FURNACES, HEATING

Pulverized-Coal-Fired. Operating Experiences with Pulverized-Coal Rolling-Mill Furnaces (Betriebserfahrungen mit kohlenstaubgefeuerten Walzwerksöfen), A. Koegel. Stahl u. Eisen, vol. 47, no. 22, June 2, 1927, pp. 915–918 and (discussion) 918–920, 12 figs. Reasons for installation of pulverized-coal furnaces in Klöckner steel works; operating results.

Status of Pulverized-Coal Firing in Rolling Mills (Uebersicht über den Stand der Kohlenstaubfeuerung in Walzwerken), G. Bulle. Stahl u. Eisen, vol. 47, no. 20, May 19, 1927, pp. 817–826, 15 figs. Advantages and disadvantages; types of pulverized-coal furnaces, including ingot-heating and annealing furnaces.

G

GAGES

Piston Pressure. An Experimental Study of the Piston Pressure Gage to Six Hundred Atmospheres, F. G. Keyes and J. Dewey. Optical Soc. of Am.—Jl., vol. 14, no. 6, June 1927, pp. 491–504, 1 fig. Method of extending comparisons of piston-type pressure gage with mercury column used by Holborn and Schulze has been modified.

How to Make a Mercury Absolute Pressure Gage. Power, vol. 66, no. 1, July 5, 1927, pp. 17–18, 2 figs. Absolute pressure may be read directly; only one instrument required; temperature and other corrections eliminated.

GAS ENGINES

Permanent-Gas. Is the Permanent-Gas Engine a Possibility? J. Sturgess. Power, vol. 65, no. 26, June 28, 1927, pp. 990–992. Old-time hot-air engine failed because of its low temperature range; by increasing maximum temperatures to 1100 deg., net efficiency of 24 per cent is claimed; pressures are low when compared to other modern machines of equal efficiency.

GAS PRODUCERS

Charcoal. The Installation of a Charcoal Gas Producer on Board the Yacht "Remi" (Note au sujet de l'installation d'un gazogène à bois à bord du yacht "Remi"). Bul. Technique du Bureau Veritas, vol. 9, no. 1, Jan. 1927, pp. 3–5. Description of Malbay generator; propulsion and service auxiliaries; operation; tests and results obtained.

GASOLINE

Air Determination in. Apparatus to Determine Air in Gas, F. P. Peterson. Oil & Gas Jl., vol. 26, no. 5, June 23, 1927, p. 162. Skill necessary in making tests if accurate results are required; explains usual sources of error.

GEARS

Pinion Cutting. Pinions Cut from Enlarged Blanks. Machy. (Lond.), vol. 30, no. 765, June 9, 1927, pp. 289–292, 5 figs. Increased strength of enlarged pinions and data for establishing blank sizes; question of tooth interference; increase in center distance and pressure angle; effect on base circle radius; cutting over-size gears.

Steel Ring and Cast-Iron Center. Builds Gears with Steel Ring and Cast-Iron Center. Iron Trade Rev., vol. 81, no. 1, July 7, 1927, p. 13, 2 figs. Gear design, which has forged steel teeth and a semi-steel hub, has been developed by Hill Clutch Machine & Foundry Co., Cleveland; construction is simply annular forged ring in which is cast hub either with web or arms depending on dimensions; after casting, completed gear is finish machined and teeth cut.

Tooth Loads. The Influence of Elasticity on Gear-Tooth Loads. Mech. Eng., vol. 49, no. 8, Aug. 1927, pp. 907–910, 6 figs. Progress report No. 6 of A.S.M.E. special research committee on strength of gear teeth; impact loads.

Worm. Some Common Misconceptions in Worm Gear Design, H. L. Blood and D. V. Waters. Am. Mach., vol. 66, no. 25, June 23, 1927, pp. 1041–1042, 8 figs. Better design is sometimes obtained if addenda of worm and gear are unequal; increase of pressure angle used to avoid under cutting; simplified gear-blank form.

Worm-Wheel Contact. Worm-Wheel Contact, E. Buckingham. Mech. Eng., vol. 49, no. 7, July 1927, pp. 785–792 and (discussion) 792–793, 20 figs. Preliminary report of A.S.M.E. special research committee on worm gears; shows how any worm-wheel contact condition can be determined by analysis and points out in particular probable influence of nature of contact lines between a worm and a worm wheel upon lubrication conditions, efficiency, and load-carrying ability; analyses of three helicoids and their equations; contact lines of screw helicoids used as worms and those of involute helicoids used as worms; contact lines of screw helicoids with large helix angles, and involute helicoids with large helix angles.

GLUE

Metal Polishing. Glue—Its Importance in Metal Polishing, W. S. Barrows. Can. Foundryman, vol. 18, no. 5, May 1927, pp. 17–19. Not only has best glue been specified, but particular kind of best glue has been found necessary, namely—"skin glue" or "hide glue" made from skins or hides of animals.

GRINDING

Grinding Index Plates. Grinding Notched-Tooth Index-Plates. Machy. (N. Y.), vol. 33, no. 12, Aug. 1927, p. 904, 2 figs. Index plates used on several sizes of bevel and spiral-bevel gear generators built by Gleason Works, Rochester, N. Y.; limits specified for distance from tooth to tooth on these plates are plus and minus 0.0002 in.

Jobbing Shop. Unusual Grinding Problem in a Jobbing Shop, H. R. Simonds. Abrasive Industry, vol. 8, no. 7, July 1927, pp. 216–218, 4 figs. Methods and equipment at plant of Taft-Pierce Mfg. Co., Woonsocket, R. I.; grinding connecting-rod forks.

GRINDING MACHINES

Dry. Electrically Driven Double Dry-Grinding Machines. Engineer, vol. 143, no. 3727, June 17, 1927, p. 667, 4 figs. Built by B. R. Rowland & Co., for New Zealand railway; particularly intended for fettling purposes in foundries, steel forgings or for constructional work.

Leaf-Spring. Badger Leaf-Spring Grinder. Am. Mach., vol. 66, no. 26, June 30, 1927, p. 1113, 2 figs. For automatically grinding eyes of leaf springs and bumpers.

Sheet-Edge. A New Sheet Edge Grinding Machine. Engineer, vol. 143, no. 3728, June 24, 1927, p. 692, 1 fig. Soag G. I. sheet grinder built with object of rapidly grinding and slightly beveling both edges.

Universal. Landis Self-Contained Universal Grinding Machines. Machy. (N. Y.), vol. 33, no. 11, July 1927, pp. 869–870, 2 figs. Each machine is equipped with three motors, one of which drives work-head, another wheel-head, and third, carriage power-traverse and water pump.

H

HAMMERS

Forging. 15-Ton Steam-Lift Free-Tup Drop Forging Hammer. Engineering, vol. 123, no. 3206, June 24, 1927, p. 765, 4 figs. partly on p. 768. Drop hammer, having tup weighing about 15 tons, made by Eumuco Aktien-Gesellschaft, near Cologne, Germany.

Pneumatic. "Clear Space" Pneumatic Power Hammer. Engineer, vol. 143, no. 3727, June 17, 1927, p. 666, 2 figs. New range of hammers introduced by B. & S. Massey, Manchester, Eng., which provide adequate clear space above and around anvil block for easy manipulation of bulky tools and jobs.

HANGARS

Hamburg, Germany. The New Airplane Hangars in Hamburg-Fuhlsbüttel (Die neuen Flugzeughallen A und B in Hamburg-Fuhlsbüttel), Leo. Bautechnik, vol. 5, no. 22, May 20, 1927, pp. 311–316, 9 figs. General plan of Hamburg airport; plans and sections of hangars, 32 by 60 m. and 42 by 97 m.; details of hinged roof trusses; methods of steel erection; concrete work; heating system.

HARDNESS

Brinell Test. Need Shown for Changed Brinell Hardness Test Methods. Automotive Industries, vol. 57, no. 3, July 6, 1927, pp. 88–89, 5 figs. Investigation shows that in tests measurements should be made while ball is under load; elasticity of metal influence results otherwise.

Testing. Determination of the Fatigue Hardness of Metals. Eng. Progress, vol. 8, no. 5, May 1927, pp. 131–132, 4 figs. Oscillatory testing machine manufactured by firm of Carl Schenck in Darmstadt permits of testing bar-shaped test pieces under tension and compression alternating at 500 oscillations per sec.

HEAT TRANSMISSION

Buildings. Graphical Determination of Heat-Transmission Coefficients of Buildings (Die graphische Bestimmung der Wärmedurchgangszahlen von Gebäuden), R. Meisterhans. Gesundheits-Ingenieur, vol. 50, no. 23, June 4, 1927, pp. 438–443, 12 figs. Theoretical discussion of physics of phenomenon, combined with experimental determinations, leads up to practical data in form of tables and graphs giving coefficients of conductivity and thermal resistance of common building materials of various degrees of thickness.

Insulating Materials. Heat Transfer Through Insulation in the Moderate and High-Temperature Fields: A Statement of Existing Data, L. B. McMillan. Mech. Eng., vol. 49, no. 8, Aug. 1927, pp. 898–907, 16 figs. Sets forth state of existing knowledge on heat transfer through insulating materials as indicated by literature on subject; shows in what respects this knowledge is insufficient; and points out directions in which future research work is most urgently needed; particular field of research is literature referring to heat transfer through insulation in temperature range between refrigeration field on one hand and refractories field on other.

Testing. Methods of Testing for Heat-Transmission Coefficients (Kritische Betrachtung der Prüfverfahren für Wärmeleitzahlen), E. Raisch. Archiv für Wärmewirtschaft, vol. 8, no. 5, May 1927, pp. 133–137, 8 figs. Thermotechnical testing of materials; accuracy of measuring methods in common use; reasons for faulty measurements.

HEAT TREATMENT

Practice. Metals and Their Heat Treatment, S. G. Williams. Roy. Aeronautical Soc.—Jl., vol. 21, no. 198, June 1927, pp. 602–613. Deals with heat treatment of alloy steels and light alloys; points out that all functions of hardening and tempering can be better carried out if ideal temperatures are worked to; quenching oil is often not cold enough toward end of day.

HEATING

Calculation. Simple Methods for Computing Heating and Cooling-Off Phenomena (Einfachste Verfahren zur Berechnung des Abkühlungs- und Anheizvorganges), W. Matschinsky. Gesundheits-Ingenieur, vol. 50, no. 24, June 11, 1927, pp. 453–455, 5 figs. Develops simple general expressions of temperature as function of time, which checks fairly well with more rigorous and much more complicated classical analysis of Fourier, as well as recent one by E. Schmidt.

HEATING, STEAM

District. Steam Distribution Service in New York City. Eng. & Boiler House Rev., vol. 40, no. 12, June 1927, pp. 607–610, 5 figs. Details of equipment for supplying steam over wide area of New York City.

The Use of Power Stations for the Heating of Buildings in Near-by Sections (Het gebruik van electriciteitsfabrieken voor verwarming van gebouwen in nabij gelegen stadsgedeelten), J. J. F. Smits. Ingenieur, vol. 42, no. 3, Jan. 15, 1927, pp. 37–45, 11 figs. Practice of central heating and hot-water supply in Dutch cities, particularly Utrecht, also cost data.

Hospitals. The Heating Installation of University College Hospital, London. Engineering, vol. 124, no. 3207, July 1, 1927, pp. 1–4, 20 figs. Steam required for heating amounts to 750 lb. a day during winter period; whole quantity is supplied by 5 Lancashire boilers.

Stores. Engineering Work in Provincial Stores. Engineer, vol. 144, no. 3730, July 8, 1927, p. 47, 6 figs. Heating installation is operated on vacuum steam system; high-pressure steam is used for hot-water supplies.

HOBBING MACHINES

Single-Purpose. No. 34 Gear Hobbing Machine (Single Purpose). Iron & Steel of Can., vol. 10, no. 5, May 1927, p. 153. Furnished with change gears and bracket to hob only one specified size of gear; it is designed efficiently to handle quantity production of spur gears of from 8 to 35 teeth, and is equipped for hobbing only one particular size in this range.

HOISTS

Blocks. A New Type of Electric Hoisting Block. Eng. Progress, vol. 8, no. 6, June 1927, pp. 145–146, 4 figs. Describes block put on market by firm of Bamag-Dessau with only two sets of gears.

HUMIDITY

Walls and Ceilings. Condensation of Atmospheric Humidity and the Combating of Dampness in Walls and Ceilings (Ueber Kondensation des Luftwasserdampfes in den die Gebäuderäume umschliessenden Bauteilen und Bekämpfung des Feuchtwerdens der Wände und Decken), W. Matschinsky. Gesundheits-Ingenieur, vol. 50, no. 20, May 14, 1927, pp. 369–370, 2 figs. Discussion of physics of phenomenon and suggested cellular wall construction, making use of cork and other insulating materials, among them "Solomit," Russian material made of straw.

HYDRAULIC GEARS

Variable-Speed. An Improved Variable Speed Gear. Colliery Eng., vol. 4, no. 40, June 1927, pp. 237–238 and 252, 5 figs. Improved design of hydraulic variable-speed gear for use in collieries.

HYDRAULIC TURBINES

Governors. Problems in the Use of Water Wheel Governors. Power Plant Eng., vol. 31, no. 14, July 15, 1927, pp. 795–796. Discusses possibility of omitting governors entirely, together with data on various governor details and operating problems.

Governing Gear for Impulse Water Turbines. Engineering, vol. 124, no. 3210, July 22, 1927, pp. 106–107, 5 figs. Details of governing brought out by P. Pitman, consisting of a tube made of stainless steel and having slot through it in way of jet; it is capable of being rotated on its horizontal axis and is carried on ball or roller bearings.

Pelton. Large Vertical-Shaft Pelton Wheels (Turbines Pelton à axe vertica de Maipo). Bul. Technique de la Suisse Romande, vol. 25, no. 24, Nov. 20, 1926, pp. 291–292, 1 fig. Ordinary type of Pelton wheel, with horizontal shaft, does not lend itself to use of more than two jets, hence multiple wheels have frequently to be employed; with vertical shafts, however, four jets can be used, and space occupied by machine is materially reduced; leading particulars are given concerning three Escher-Wyss machines of this type

for Maipo (Chile) plant; spear rods pass through supply pipe, and latter, in form of spiral, serves as support for alternator. See also Génie Civil, vol. 90, no. 11, Mar. 12, 1927, p. 275, and brief translated abstract in Power Engr., vol. 22, no. 255, June 1927, p. 233.

I

ICE PLANTS

Diesel-Engine Drives. Diesel Engine Drive for Ice Plants, R. L. Howes. Ice & Refrigeration, vol. 72, no. 6, June 1927, pp. 573–576, 3 figs. Paper read before Nat. Assn. Practical Refrig. Engrs. Reliability of Diesel engines; repair and maintenance expense.

Improvements. Money is Not Required To Improve an Ice Plant, C. T. Balser. Power, vol. 66, no. 4, July 28, 1927, pp. 133–134. In many of these needed improvements call for no great capital outlay and no super engineering talent to outline and execute.

Raw-Water. A Modern Raw Water, Ice Making Plant at Richmond, Virginia, T. Mitchell. Ice & Refrigeration, vol. 73, no. 1, July 1927, pp. 17–19, 5 figs. New plant of Electric Ice Manufacturing Co., Richmond, Va.; cash-and-carry system a feature; labor reduced to minimum; particulars of refrigerating equipment.

INDUSTRIAL MANAGEMENT

Creative Leadership. The Nature and Uses of Creative Leadership, O. Tead. Taylor Soc.—Bul., vol. 12, no. 3, June 1927, pp. 394–406. Considered from point of view of modern psychology and pedagogy.

World Economics and. Scientific Management and World Economics, E. E. Hunt. Taylor Soc.—Bul., vol. 12, no. 3, June 1927, pp. 382–393. Report on economic conference at Geneva; work of important committees; influence of and challenge to scientific management. Scientific Management and Cartels, by H. S. Person.

INDUSTRIAL PLANTS

Equipment Location. Reducing Unit Labor Cost 20 Per Cent, J. A. Piacitelle, Mfg. Industries, vol. 14, no. 1, July 1927, pp. 31–32, 6 figs. Studies of machines and other work places show how to arrange equipment to lower fatigue and increase production.

Location. An Analysis of Factors Affecting Plant Location, J. J. Berliner. Indus. Mgmt. (N. Y.), vol. 74, no. 1, July 1927, pp. 39–41. Economic factors governing selection of industrial site; part played by raw materials in factory location; skilled and unskilled labor; question of power; nearness to market.

Maintenance. Keeping the Factory in Running Order, A. B. Vieth. Indus. Mgmt. (N. Y.), vol. 74, no. 1, July 1927, pp. 11–14. Practical aspects of general plant maintenance.

Noises. The Tremendous Toll of Industrial Noise, C. F. Faulkner. Factory, vol. 38, no. 6, June 1927, pp. 1079–1081, 1172, 1174, 1176, and 1178, 9 figs. Deals with different kinds of disability which result from noise and vibration; characteristics of sound waves; bad effects of noise are considered as of three kinds: diseases of ear, which are always accompanied by some impairment of hearing, if not complete deafness; temporary phenomena such as faintness; and, as a contributory factor, or aggravation, functional nervous disorders.

Power, Management of. Management of Industrial Power—The Engineer's Viewpoint, H. F. Scott. Mech. Eng., vol. 49, no. 8, Aug. 1927, pp. 853–855 and (discussion) 855–856. Contacts which management should have with power-plant problems; responsibility that management should delegate engineers who supervise work.

Management of Industrial Power—The Executive's Viewpoint, W. N. Polakov. Mech. Eng., vol. 49, no. 8, Aug. 1927, pp. 850–852 and (discussion) 852. Presents logical outline for executive inquiry into industrial power problem. See also Power, vol. 66, no. 4, July 26, 1927, pp. 126–128, 2 figs.

INDUSTRIAL TRUCKS

Lift. Cutting Storage and Shipping Costs, F. L. Eidmann. Indus. Mgmt. (N. Y.), vol. 74, no. 1, July 1927, pp. 28–32, 13 figs. Adaptability of lift truck and skid system.

Modern Types. Progress in Short-Distance Transportation (Verbessergun im Nahtransportwesen), E. Bohn. Centralblatt der Hütten u. Walzwerke, vol. 31, no. 17, Apr. 27, 1927, pp. 219–221, 5 figs. Recent types of transportation equipment of German mines, foundries, rolling mills, etc., among them trucks with hydraulic-lift platforms, also trailers with positive double steer making unusually short turns (35 cm. radius).

INSPECTION

Navy Material. Inspection of Naval Material, H. C. Dinger. Am. Mach., vol. 67, no. 2, July 14, 1927, pp. 59–60. Methods used in inspecting material at source of supply; advantages to be secured by consolidation of inspection offices are many and great.

INTERNAL-COMBUSTION ENGINES

Exhaust-Gas Utilization. The Recovery and Utilisation of Heat from the Exhaust Gases of Internal Combustion Marine Engines, T. Clarkson. Inst. Mar. Engrs.—Trans., vol. 39, June 1927, pp. 215–229 and (discussion) 229–253. Analyzes conditions which are most favorable to heat recovery; boilers used for waste-heat recovery; utilization of recovered heat.

Oil Pumps. Experiments with Rotary Pumps and Gear Pumps (Versuche an Kapsel- und Zahnradpumpen), F. Aschner and L. Mattheus. Motorwagen, vol. 30, no. 7, Mar. 10, 1927, pp. 139–151, 56 figs. Tests to determine volumetric efficiency, or ratio of actual delivery to theoretical delivery per unit of time, of oil pumps with various values of pressure, pump speed and oil temperature, in order to ascertain most favorable conditions for functioning of pump; rotary lubrication pump from Hispano-Suiza airplane engine, gear pump for automobile engines by Breuer and Co. and gear pump by Ludwig Loewe & Co., were tested by means of special plant; results are given by means of series of curves of volumetric efficiency both as function of viscosity and of pump speed, with various values of pressure, and also of delivery as function of pressure with various speeds. See brief translated abstract in Roy. Aeronautical Soc.—Jl., vol. 31, no. 198, June 1927, pp. 556–557.

Valves. Combined Cuff and Mushroom Valve for Internal-Combustion Engines. Engineering, vol. 123, no. 3205, June 17, 1927, p. 751, 1 fig. Designed by M. Schulp; it embodies ordinary overhead mushroom valve surrounded by cuff valve; two annular spaces surrounding latter constitute ports, upper being inlet, and lower exhaust port.

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; GAS ENGINES; OIL ENGINES.]

IRON AND STEEL

Corrosion. Report of Committee A-5 on Corrosion of Iron and Steel. Am. Soc. Testing Matls.—Advance paper, no. 12, for mtg. June 20–24, 1927, 72 pp., 22 figs. partly on supp. plate. Report on inspection of Fort Sheridan and Annapolis tests; specifications for zinc-coated products; zinc-coated sheets; testing zinc-coated iron and steel (galvanized) wire and wire products, iron or steel telephone and telegraph line wires, iron or steel tie wires, wire fencing, chain-link fence fabric galvanized before weaving, and after weaving; methods of testing; field tests of metallic coatings.

IRON CASTINGS

Gas Holes. Absorbed Gases in Iron and the Creation of Gas-Holes in Castings, B. Hird. Foundry Trade Jl., vol. 35, no. 565, June 16, 1927, pp. 495–497, 3 figs. As result of experiments and past experience following conclusions are arrived at: sprigs, chaplets, studs, etc., are always source of danger; their contact with molten metal in mold should be avoided wherever possible; when chills, or metal inserts of any kind, are used in molds in contact with molten metal, vent holes should be put in them to allow gases to escape; where chills are brought up to high temperature in mold they should be renewed at frequent intervals; molds having inserts should be poured with metal as dull as is consistent with type of casting; amount of gas given off by chills, etc., is largely influenced by temperature to which they are raised by molten metal in mold, before solidification takes place; all cast metals give off gases when liquid and during solidification until they reach point well below dull red.

Large. The Manufacture of Large Castings (La Fabrication des grosses pièces en fonte), H. Fabre Fonderie Moderne, vol. 21, May 25, 1927, pp. 125–131, 4 figs. Deals with castings of large dimensions which present difficulties in molding; material employed, patternmaking, molding, defects, etc.

Machined. Why Machined Castings Change Shape, F. E. Cardullo. Machy. (N. Y.), vol. 33, no. 12, Aug. 1927, pp. 905–906, 3 figs. Causes of charge in castings; effect of removing stressed metal; cause of distortion often misunderstood; effect of stresses from peening flat surfaces.

K

KEYS

Design. Keys and Keyways, H. Bentley. Mech. World, vol. 81, no. 2106, May 13, 1927, pp. 335–337, 29 figs. Types of keys and their application.

KILNS

Downdraft Periodic, Firing. Notes on Firing in Downdraft Periodic Kilns, R. Linton. Am. Ceramic Soc.—Jl., vol. 10, no. 7, July 1927, pp. 493–500, 15 figs. Results of series of investigations chiefly in connection with firing, with general discussion of factors entering into heat treatment of silicate materials.

L

LABORATORIES

Foundry. Laboratories and Works of Beecroft & Partners, Limited. Foundry Trade Jl., vol. 35, no. 565, June 16, 1927, pp. 503–504, 2 figs. Laboratories comprise balance and combustion room, which is equipped with gas-fired 4-tube carbon combustion furnace fitted with Huxley type of special muffle; reference is made to carbon train of this furnace as into this, important modifications have been introduced by laboratory staff.

LACQUERS

Duco for Rolling Stock. The Frisco's Experience with Lacquer, H. L. Worman. Ry. Age, vol. 82, no. 30, June 25, 1927, pp. 2013–2015. Use of Duco for two and one-half years shows its economy on locomotives and passenger cars.

LATHES

Camshaft Turning Machine. Integral Camshaft Turning Machine. Machy. (Lond.), vol. 30, no. 767, June 23, 1927, pp. 357–359, 5 figs. Machine is production of firm of Harry F. Atkins; one operator can work two of these machines, output of each being from 8 to 10 camshafts per hour, either from solid or from forging.

Center. 8½-Inch Centre Tool Room Lathe. Machy. (Lond.), vol. 30, no. 767, June 23, 1927, pp. 376–377, 2 figs. Dean, Smith & Grace, Ltd., Keighley, have introduced lathe with V-bed.

Milling Tool for. Special Milling Tool for Turret Lathe, B. J. Stern. Machy. (N. Y.), vol. 33, no. 12, Aug. 1927, pp. 933–934, 1 fig. Tool is used for milling four angular tooth clearances in small brass pinion.

Screw-Cutting. 18-Inch Sliding, Surfacing, and Screw-Cutting Lathe. Engineering, vol. 123, no. 3205, June 17, 1927, pp. 748–749, 3 figs. Constructed by Tangyes, Ltd., Birmingham, England; work up to length of 23¼ ft. can be carried between centers and gap is provided for face-plate work.

Semi-Automatic. Bradford Special Manufacturing Lathe. Am. Mach., vol. 66, no. 25, June 23, 1927, pp. 1071–1072, 2 figs. For turning and facing; bell-housing cases for an automotive manufacturer built by Bradford Machine Tool Co., Cincinnati, Ohio.

Turret. Acme Brass Turret Lathe. Machy. (N. Y.), vol. 33, no. 12, Aug. 1927, pp. 951–952, 1 fig. New 20-in. full universal lathe designed to meet demands of shops machining variety of parts made of brass or similar metals. See also description in Iron Age, vol. 120, no. 4, July 28, 1927, p. 208, 1 fig.

LIGNITE

Briquetting. The Briquette Works at Yallourn, Victoria, Australia, F. W. Foos. Eng. Progress, vol. 8, no. 5, May 1927, pp. 113–117, 8 figs. Site and extent of lignite deposits at Yallourn; mining lignite; large electric power station; description of briquette works; steam and electrically driven briquet presses.

By-Product Extraction. Advantages of Systematic Physico-Chemical Working of Lignite (Welche Vorteile ergeben sich aus einem systematischen, physikalishchemischen Abbau der Braunkohle), F. Seidenschnur. Braunkohle, vol. 26, no. 6, May 7, 1927, pp. 121–129, 6 figs. Discusses drying processes and equipment, extraction of tar-forming substances and their utilization, also distillation of lignite coke, with details of plant.

Combined Drying and Pulverizing. Simultaneous Drying and Pulverizing (Mahltrocknung), P. Rosin. Braunkohle, vol. 26, no. 13, June 25, 1927, pp. 261–268, 2 figs. Describes German apparatus which in one operation, pulverizes and dries lignite rich in moisture reducing moisture content from 60 to as low as 10 per cent, by means of hot gases; experiments reported and discussed.

Distillation Plants. Proposed Improvements in the Heat Economy of Lignite Distillation Plants (Vorschläge zur Weiterentwicklung der Braunkohlenschwelerei nach wärmewirtschaftlichen Gesichtspunkten), J. Schulte. Braunkohle, vol. 26, no. 9, May 28, 1927, pp. 181–191, 7 figs. Analysis of heat economy of Rolle Schulte compound and K.V.G. lignite-distilling furnaces, also special coke-gas producers.

Drying. The Drying of Lignite of High Moisture Content (Die Trocknung wasserreicher Braunkohle), H. Fleissner. Archiv für Wärmewirtschaft, vol. 8, no. 6, June 1927, pp. 185–186, 2 figs. Phenomena occurring in drying and disintegration of lignitic brown coals; means for prevention of disintegration; describes new drying process which preserves coal lumps in their original form.

Tar Recovery. A Lignite Tar Produced by Distillation with Steam (Ueber einen durch Wasserdampfverschwelung gewonnenen Braunkohlen-Dampfteer), W. Fischer. Braunkohle, vol. 26, no. 12, June 18, 1927, pp. 246–251. Experimental process, using superheated steam, rather low in gas yield (54.8 liter per kg.), but coke is high in gas content (49.4 liter per kg.); neutral oils are heavier and richer in sulphur than those produced by ordinary methods.

LOCOMOTIVE BOILERS

Corrosion and Pitting. Corrosion and Pitting in Locomotive Boilers, C. A. Seley. Ry. Club of Pittsburgh—Official Proc., vol. 26, no. 6, Apr. 28, 1927, pp. 121–154. Review of recommendations contained in prize paper by W. M. Barr, with brief résumé of reasons therefor and views of other writers.

Research. Improving the Locomotive Boiler by Research, L. H. Fry. Ry. Age, vol. 82, no. 28, June 11, 1927, pp. 1878–1883, 3 figs. Efficiency of combustion and efficiency of heat absorption; absorption of heat by radiation; transfer of heat by gas convection.

LOCOMOTIVES

Compound. The Work of the New Compound Locomotives of the Nord Railway. Engineer, vol. 144, no. 3732, July 22, 1927, pp. 98–99. Describes Pacific compounds designed by Breville and gives account of two runs made with them.

Design. Capacity and Economy Gained in Latest Locomotive Design, H. S. Vincent. Central Ry. Club of Buffalo—Official Proc., vol. 35, no. 3, May 1927, pp. 2354–2381, 28 figs. Practical operations have demonstrated its efficiency for greater power, speed and longer trains; locomotive of future will very likely use high steam pressure, probably from 400 to 600 lb., and be provided with water-tube firebox.

Locomotive Parts and Their Assembly (Mise en euvre des éléments des locomotives), L. Wiener. Assn. des Ingénieurs Sortis des Écoles Speciales de Gand—Annales, no. 17, 1927, pp. 239–305. Notes on engine parts, fuel, standardization, number of

locomotives for one system; standardization of locomotives and their parts; locomotive capacities; establishment of specifications; damping.

Modern Locomotive Design. Pac. Ry. Club—Jl. vol. 11, no. 2, May 1927, 35 pp., 16 figs. Its significant influence on railroad operation.

Design and Construction. Report on Locomotive Design and Construction. Ry. Age, vol. 82, no. 28, June 11, 1927, pp. 1883–1895, 12 figs. Standardization of fundamental parts of locomotives; rail stresses under locomotives; provisions for expansion of locomotive boilers on frames; boiler pressures higher than 200 lb.; oil-electric locomotives. Paper read before Am. Ry. Assn.

Diesel-Electric. The Development of the Diesel-Electric Locomotive. Engineering, vol. 123, nos. 3201 and 3206, May 20 and June 24, 1927, pp. 608–610 and 760–763, 21 figs. 6 figs. partly on supp. plate. Details of 300-hp. 6-cylinder crude-oil engine for railway traction developed by Wm. Beardmore & Co.

The Diesel-Electric Locomotive, F. K. Fieldes. Ry. Age, vol. 82, no. 29, June 18, 1927, pp. 1939–1942, 6 figs. Pennsylvania-Bessemer four-wheel Diesel locomotives; locomotive is designed for single-end control; engines have normal speed of 800 r.p.m.; cooling system designed for variety of conditions. Abstract of paper read before section meeting of Am. Soc. Mech. Engrs. at Altoona.

Diesel Locomotives, L. G. Coleman. Ry. Club of Pittsburgh—Officials Proc., vol. 26, no. 7, May 26, 1927, pp. 159–182, 3 figs. If satisfactory internal-combustion locomotive using oil for fuel can be developed for all classes of service, overall thermal efficiency can be increased from present 5 or 6 per cent of steam, to 25 per cent; internal-combustion locomotive shows immediate saving in fuel burned, roughly in proportion to its thermal efficiency; oil-electric locomotives require much less roundhouse and shop capacity.

Diesel-Engined. Diesel-Engined Locomotives and Railway Motor Cars (Automotrices actionnées par moteurs à huiles lourdes Diesel et analogues), M. Mellini. Industrie des Voies Ferrées et des Transports Automobiles, vol. 21, no. 244, Apr. 1927, pp. 207–214, 4 figs. Deals with possibilities of Diesel engine as substitute for steam traction and electric traction; Diesel-electric locomotives and rail cars; Diesel-hydraulic and Diesel-pneumatic locomotives.

Drafting. The Next Step in the Development of Locomotive Drafting, W. F. M. Goss. Ry. Age, vol. 82, no. 28, June 11, 1927, pp. 1900–1903, 3 figs. Comprehensive review of development of draft and draft appliances used in modern steam locomotive; forecasts probable future development of turbo-exhauster shown by service tests to have many important advantages. Paper read before Am. Ry. Assn.

Forced Draft. Forced Draft Through Closed Ash Pans in Locomotives. Ry. Age, vol. 83, no. 2, July 9, 1927, pp. 63–64, 3 figs. Among most interesting developments in connection with locomotive operation is that of forced or controlled draft, as applied to a 2-10-2 locomotive on Texas & Pacific.

4-Cylinder. 4-6-0 Type 4-Cylinder Locomotive For The Great Western Railway. Engineering, vol. 124, no. 3208, July 8, 1927, p. 56, 3 figs. Details of new express passenger locomotive constructed by Swindon works, known as King class.

Internal-Combustion. Benzol Locomotives and Railway Motor Cars for Field and Plant (Benzol-Lokomotiven und Benzol-Triebwagen für Feld- und Industriebahnen), Trautvetter. Fördertechnik u. Frachtverkehr, vol. 19, no. 4, Feb. 18, 1927, pp. 89–92, 7 figs. Principal German types, including Diesel locomotives, and rail motor cars, with special equipment, such as cranes, skips, etc.; comparison between benzol locomotive and motor truck; advantages and disadvantages of internal-combustion vehicles.

Internal Combustion Motive Power. Ry. Mech. Engr., vol. 101, no. 7, July 1927, pp. 433–441, 6 figs. Abstracts of Am. Ry. Assn., Mechanical Division, committee reports on automotive rolling stock, and paper on oil-engine locomotives, by A. I. Lipetz.

A New Switching Engine (Eine neue Verschiebemaschine), Caesar. Glasers Annalen, vol. 100, no. 9, May 1, 1927, pp. 133–136, 8 figs. Description and operating cost data of patented light, internal-combustion locomotive for small, local railway stations; capacity of engine, 20 hp., speed 1 to 5 m. per sec.

Oil-Engined. The Status of the Oil-Engine Locomotive, A. I. Lipetz. Ry. Age, vol. 82, no. 28, June 11, 1927, pp. 1069–1875. Oil engines for transmission locomotives; power transmission; locomotives with direct drive. Paper read before Am. Ry. Assn.

Progress. Progress of the Steam Locomotive. Ry. Mech. Engr., vol. 101, no. 7, July 1927, pp. 405–423, 12 figs. Review of three papers presented before Am. Ry. Assn., as follows: Locomotive Development and Cost of Operation, W. H. Winterrowd; Improving the Locomotive Boiler by Research, L. H. Fry; Developments in Locomotive Drafting, W. F. M. Goss.

Reconditioning. Reconditioning Locomotives with Modern Equipment, F. W. Curtis. Am. Mach., vol. 67, nos. 1, 2, and 4, July 7, 14 and 28, 1927, pp. 5–6, 45–47 and 155–157, 18 figs. Machine and erection shop laid out to handle group repairs economically; longitudinal pit tracks have capacity for 35 locomotives; valve-setting machine. July 14: Tool for trepanning connecting rods; boring fixture for eccentric rods; lapping device for fitting piston rods to crossheads. July 28: Testing stand for reconditioned air motors; grinding in cylinder heads; air-operated machines for pipe and pipe clamps; drilling steel-tired wheels.

Superheater. Calculation of Superheater Locomotives with Simple Steam Expansion (Verfahren zur Berechnung von Heissdampflokomotiven mit einfacher Dampfdehnung), K. Koref. Organ für die Fortschritte des Eisenbahnwesens, vol. 82, no. 8, Apr. 30, 1927, pp. 139–145, 3 figs. Author seeks to develop method of calculating relations between coefficients of model of a superheater locomotive with simple steam expansion in 2, 3 or 4 uniform steam cylinders.

Utilization. Report on Locomotive Utilization. Ry. Age, vol. 82, no. 28, June 11, 1927, pp. 1908–1912. Statistics for supervising utilization of locomotives; dispatching of locomotives and trains; locomotive repairs. Report to Am. Ry. Assn.

Valve Gears. The Caprotti Poppet Valve-gear, A. Caprotti. Mech. World, vol. 81, no. 2106, May 13, 1927, pp. 342–344, 6 figs. Cam-operated drop-valve gear, manipulated through usual reverse lever in such way that on notching up, cut-off may be reduced from full gear to minimum of about 5 per cent without varying appreciably lead of admission.

Motion Work on the L.V.R.R., S. A. Hand. Am. Mach., vol. 66, no. 25, June 23, 1927, pp. 1037–1040, 10 figs. Equipment employed for removal and replacement of eccentric cranks of Walschaerts and Baker valve gears.

LUBRICANTS

Infection from. Infection from Lubricants, F. L. MacNamara. Safety Eng., vol. 53, no. 6, June 1927, pp. 243–248. Results of Houghton investigation; infection is bacterial; bacteria, or germ, is not present in oil; germ has no power to create boil or sore until it has secured ingress to skin; all cutting oils have skin-penetrating powers.

Specification Writing. Specification-Writing for Petroleum Lubricants, M. R. Schmidt. Soc. Automotive Engrs.—Jl., vol. 20, no. 6, June 1927, pp. 750–753. Numerous examples are given to show that many specification writers are lamentably ignorant of characteristics that are and are not relevant, of nature of materials and of limitations of analysis and test methods.

Wax. Wax Lubricants, D. W. Mathison. Bell Laboratories Rec., vol. 4, no. 5, July 1927, pp. 390–391. Uses of wax lubrication.

LUBRICATING OILS

Carbon-Depositing Tendency. Carbon and Lubricating Oils. Soc. Automotive Engrs.—Jl., vol. 20, no. 6, June 1927, pp. 688–690, 1 fig. Carbon-depositing tendency of heavier motor oils; Conradson carbon-residue test; from these considerations it appears desirable to use an oil viscous enough to supply necessary lubrication, but volatile enough to vaporize after it has reached piston and cylinder-head surfaces, leaving minimum of residue.

Constitution and Synthesis. Constitution and Synthesis of Lubricating Oil [Betrachtungen über die Zusammensetzung und chemische Konstitution schmierfähiger Körper (Schmieröle) und ihre Synthese], A. Spilker. Petroleum, vol. 23, no. 11, Apr. 10, 1927, pp. 448–451. Experiments in hydrogenation for producing lubricants by catalytic agency; high viscosities by hydrogenation. See English translation in Oil Eng. & Technology, vol. 8, no. 5, May 1927, pp. 183–184.

LUBRICATION

Factory Equipment. Lubrication: The Vital Point of Maintenance, K. D. Hamilton. Factory, vol. 38, no. 6, June 1927, pp. 1093–1095, 5 figs. Surest provision for unfailing lubrication is definite schedule for each lubricating operation, and rigid observation of that schedule; problems of steam-engine, and steam-turbine lubrication.

High-Temperature. High Temperature Lubrication. Lubrication, vol. 13, no. 5, May 1927, pp. 49–54, 7 figs. Factors which must be considered when selecting lubricants for such service.

Oil Coolers. Oil Cooler Cleaning Made Easy, W. H. Burton. Power, vol. 66, no. 2, July 12, 1927, p. 45, 1 fig. Simple apparatus facilitates removal of oil sludge from oil-cooler tube bundles; its installation is justified when considerable number of coolers must be cleaned during year.

M

MACHINE SHOPS

Providing for Expansion. Providing for Expansion in Manufacturing, H. Rowland. Machy. (N. Y.), vol. 33, no. 12, Aug. 1927, pp. 924–925, 4 figs. Description of initial installation in which need for future expansion was considered.

MACHINE TOOLS

Beltless. New Beltless Machine Tools, A. Bahls. Eng. Progress, vol. 8, no. 6, June 1927, pp. 165–166, 3 figs. In beltless drives electric motor is usually either direct-coupled with shaft of driven machine, or tool holder of machine is mounted right on shaft of motor; in latter case motor has to be of special design and either possesses double bearings or bearings reinforced in some other way; such machines are built for milling bodies of tooth brushes and combs, and others are designed solely for making sawn celluloid combs.

Drives and Controls. Recent Developments in Machine Tool Drives and Controls. Machy. (Lond.), vol. 30, no. 766, June 16, 1927, pp. 321–344, 58 figs. Electrical and hydraulic applications; their influence on machine design and output; characteristics and suitability of electric motors and controls; self-contained motor drive; flange motors; vertical motors; traversing and feeding motors; hydraulic drive and feed.

Servicing. Servicing Machine Tools. Machy. (N. Y.), vol. 33, no. 11, July 1927, pp. 823–824. Outlines need for definite policy in machine-tool industry.

T-Slots. Standard T-Slots for Machine Tools. Am. Mach., vol. 66, no. 26, vol. 67, no. 1, June 30 and July 7, 1927, pp. 1101 and 31, 8 figs. Reference-book sheet.

Welded Base. Circular Welded-steel Machine Base, R. E. Kinkead. Machy. (N. Y.), vol. 33, no. 11, July 1927, pp. 850–851, 3 figs. Three fundamental rules used by Engineering Department of Lincoln Electric Co.

MACHINERY

Leipzig Fair, Germany. The Engineering Spring Fair in Leipzig, A. Heller. Eng. Progress, vol. 8, no. 5, May 1927, pp. 119–122, 8 figs. Machine tools, electrical equipment, prime movers, and house and street-building equipment.

World's Production. The World's Production and Trade in Machinery. Engineer, vol. 143, no. 3727, June 17, 1927, pp. 648–649. Review of memoirs issued by Assn. of German Machine Construction Works (Verein Deutscher Maschinenbauanstalten) at request of League of Nations; deals with situation not only in Germany but also in rest of world; these memoirs may be regarded as reliable source for forming opinion of situation of machinery construction in connection with displacements which have taken place since pre-war period.

MATERIALS HANDLING

Farms. Agricultural Conveying Equipment and Installations (Fördermittel und Förderanlagen in der Landwirtschaft), Foedisch. Fördertechnik u. Frachtverkehr, vol. 20, no. 3, Feb. 4, 1927, pp. 54–57, 11 figs. German field tracks, including monorails; hay loaders and unloaders, traveling skips for cow barns, elevated driveways in barns.

MECHANISMS

Modern. Ingenious Mechanical Movements. Machy. (N. Y.), vol. 33, no. 11, July 1927, pp. 811–813, 2 figs. Contains following descriptions: Overload Release with Positive Lock, G. Sandberg; Variable and Reversing Rotation for Feed-Rolls, S. H. Helland; Triple Intermittent Worm-Gear, F. C. Mason; New Tube Operates on One-Billionth of an Ampere.

METAL SPRAYING

Lead Coating. Homogeneous Lead Coating by Means of a Fine Lead Spray (Die "Homogen-Verbleiung" vermittels Auftragen fein zerteilten Bleis), M. U. Schoop. Zeit. für angewandte Chemie, vol. 40, no. 23, June 9, 1927, pp. 672–673, 3 figs. Describes patented portable apparatus, weighing $1^1/_2$ kg., in which compressed CO_2, heated with two oxy-hydrogen flame jets, melts and atomizes 3 mm. lead strip, projecting lead spray with velocity of 6 m. per minute; lead coats thus made are sound, hard, and ductile and may be 5 mm. thick or more.

METAL WORKING

Small-Lot Production. New Profits from Small-Lot Production, W. J. Burger. Machy. (N. Y.), vol. 33, nos. 11 and 12, July and Aug. 1927, pp. 840–844 and 897–900, 16 figs. July: Deals with savings due to improved methods. Aug.: Study of savings due to improved equipment and methods.

Spinning. Metal Spinning, W. Mason. Metal Industry (N. Y.), vol. 25, no. 7, July 1927, p. 284, 1 fig. Methods of spinning candlesticks and vases.

MILLING MACHINES

Connecting Rods. Newton Connecting-Rod Milling Machine. Machy. (N. Y.), vol. 33, no. 12, Aug. 1927, p. 950, 1 fig. Improved "rise-and-fall" milling machine for slitting caps and milling bolt bosses of automobile connecting rods.

Multiple-Spindle. Automatic Multiple-Spindle Equipment for Sewing Machines. Am. Mach., vol. 67, no. 2, July 14, 1927, pp. 56–57, 6 figs. Special multiple-spindle milling and drilling machines designed for use in manufacture of sewing machines.

Rise-and-Fall. Newton Improved Rise-and-Fall Milling Machine. Am. Mach., vol. 67, no. 2, July 14, 1927, p. 74. Built at Newton Works of Consolidated Machine Tool Corp. of America, Rochester, N. Y., for slitting caps and milling bolt bosses on automobile connecting rods.

MOLDING MACHINES

German. Progress in Design of German Molding Machines (Fortschritte im deutschen Formmaschinenbau), U. Lohse. Giesserei, vol. 14, no. 23, June 4, 1927, pp. 385–390, 9 figs. Continuation of author's article published in no. 1, Jan. 2, 1926, issue of same journal; comparison between compressed-air and compressed-water operation of molding presses; compressed-air presses with and without jarring devices; portable revolving molding machines.

MOLDING METHODS

Continuous. Continuous Molding Operations with Minimum of Manual Work. Iron Age, vol. 119, no. 25, June 23, 1927, pp. 1817–1818. Methods and equipment of Maytag Co., Newton, Iowa.

Loam. A Centralising Disc in Loam, B. Shaw and J. Edgar. Foundry Trade Jl., vol. 35, no. 564, June 9, 1927, pp. 485–487, 13 figs. Loam is particularly useful in making of molds for large castings which are circular in shape, especially when but few similar castings are required; centralizing disk is good illustration of type of work for which loam is well suited as medium for taking necessary shape.

Templet. Templet Molding and Casting of Cylinder Blocks (Ein Beitrag zum Formen und Giessen

von Zylinderbüchsen nach Schablone), H. Eckart. Zeit. für die gesamte Giessereipraxis, vol. 48, no. 18, May 1927, pp. 145–148, 9 figs. Details of method employed.

MOLDS

Drying. The Investigation of Drying Equipment (Aufstellung von Richtlinien für Untersuchungen an Trockeneinrichtungen), O. Ebling. Giesserei, vol. 14, no. 23, June 4, 1927, pp. 394–398. Suggestions for setting up of heat balance, determination of mean temperatures for calculation of required heat units and determination of efficiency.

MOTOR TRUCKS

Brakes. Internal Wheel-Brakes for High-Speed Heavy Vehicles, H. D. Church. Soc. Automotive Engrs.—Jl., vol. 20, no. 6, June 1927, pp. 717–721, 5 figs. Deals primarily with internal wheel brakes for trucks and motor coaches, but passenger-car brakes with similar characteristics are considered possible; simple two-shoe internal-expanding type developed mainly by empirical methods is found to be most practical solution.

Dual-Purpose Six Wheelers. Dual Purpose Six Wheelers, M. Terry. Motor Transport, vol. 44, no. 1, 161, June 13, 1927, pp. 695–697, 3 figs. Suggestions on design to render six-wheeled chassis equally suitable for road and roadless work.

German. First International Show in Germany Since War Devoted to Trucks and Buses, E. P. A. Heinze. Automotive Industries, vol. 56, no. 23, June 11, 1927, pp. 892–895, 5 figs. Further advance in bus-body designs by German makers is noted at Cologne exposition; new six-wheel gas-electric chassis introduced; power brakes popular.

Krupp High-Speed. Modern Krupp High-Speed Trucks (Neuzeitliche Krupp-Schnellastwagen), F. Sachtleben. Kruppsche Monatshefte, vol. 8, Apr. 1927, pp. 65–71, 10 figs. Details of latest types manufactured by German firm.

MUSEUMS

German Museum, Munich. Deutsches Museum in Munich Shows Engineering and Technical Progress, E. J. Mehren. Am. Mach., vol. 67, no. 1, July 7, 1927, pp. 38a–38b. Stiffness of machinery and process exhibit has been relieved by artistic setting where possible; it is not only a museum, but peoples' laboratory; visitor himself can perform any of experiments to demonstrate fundamental laws of physics and chemistry, and of elemental machines; in addition, most of full-sized apparatus is operative and is demonstrated on request; "overseer" is provided for this purpose.

N

NON-FERROUS METALS

Corrosion. Report of Committee B-3 on Corrosion of Non-Ferrous Metals and Alloys. Am. Soc. Testing Matls.—Advance Paper, no. 19, for mtg., June 20–24, 1927, 18 pp. Total-immersion tests; spray corrosion test; accelerated-electrolytic test; atmospheric corrosion; liquid corrosion; galvanic and electrolytic action.

NOZZLES

Discharge Coefficients. A Note of the Coefficients of Discharge of Nozzles, S. J. Davies. Engineering, vol. 124, no. 3207, July 1, 1927, pp. 5–7, 5 figs. Tests carried out in order to compare orifice of tube calibrated by Watson and Schofield with German standard nozzle as calibrated in 1923 by Jakob and Erk; results of inquiry throw doubt on constancy of coefficient of German standard nozzle.

O

OIL ENGINES

Auxiliary Generating Stations. The Oil Engine Reinforces the Central Station, S. A. Hadley. Oil Engine Power, vol. 5, no. 7, July 1, 1927, pp. 462–464. Using oil-engine power to extend overloaded transmission systems.

Campbell. A New 675 H.P. Oil Engine. Brit. Motorship, vol. 8, no. 87, June 1927, pp. 110–111, 3 figs. Latest 6-cylinder Campbell unit.

Fuel-Injection Spray. Oil Sprays in Fuel Injection Engines, E. S. Beardsley. Power Plant Eng., vol. 31, no. 12, June 15, 1927, pp. 678–680, 9 figs. High-speed motion pictures show formation and characteristics of jets and effect of conditions.

Fuel-Pump Maintenance. Maintaining Fuel Pumps and Spray Valves, A. B. Newell. Oil Engine Power, vol. 5, no. 6, June 1927, pp. 402–405. Practical inspection and adjustment procedure.

Fuel Spray. Penn State Oil Spray Research, P. H. Schweitzer. Oil Engine Power, vol. 5, no. 6, June 1927, pp. 388–390, 2 figs. Experimental equipment at Pennsylvania State College.

Generator Sets. A 165 K. W. Oil Engine Driven Generator Set. Engineer, vol. 144, no. 3729, July 1, 1927, p. 19, 2 figs. Engine is four-cycle airless-injection type having 5 cylinders.

Indicators. Oil-Engine Research at Pennsylvania State College. Power, vol. 66, no. 2, July 12, 1927, pp. 54–55, 3 figs. Details of indicator employed.

Mechanical Injection. Further Developments in Mechanical Injection Oil Engines, O. Wans. Diesel Engine Users Assn.—Report, no. S 78, Apr. 29, 1927, 26 pp., including discussion, 12 figs. Describes those outstanding features that have been mainly instrumental in establishing efficiency and reliability of two- and four-cycle mechanical-injection engines for land purposes.

Pressure Indicators. The Schweitzer Oil Pressure Indicator, P. H. Schweitzer. Oil Engine Power, vol. 5, no. 7, July 1, 1927, pp. 475–479, 8 figs. Developed primarily to record pressure variations in fuel-injection lines of oil engines, but it can be used without change or with only slight modification for indicating quickly varying fluid pressures of almost any kind, such as cylinder pressures of high-speed internal-combustion engines, gas pressures in gun barrel, explosion in bombs, etc.

Solid-Injection. 275-H.P. Solid-Injection Marine Auxiliary Oil Engine. Engineering, vol. 124, no. 3207, July 1, 1927, p. 12, 1 fig. Details of 5-cylinder engines constructed by Ruston and Hornsby.

OIL FUEL

Synthetic. Processes of Manufacturing Liquid Hydrocarbons for Explosion and Combustion Engines (Les procédés de fabrication d'hydrocarbures liquides pour moteurs à explosion et à combustion, en partant des combustibles minéraux), A. Grebel. Chaleur & Industrie, vol. 8, no. 86, June 1927, pp. 324–332, 2 figs. Describes several methods for making synthetic fuels; it is believed that certain French processes will soon have passed experimental stage.

OXYACETYLENE CUTTING

Riser Removal from Castings. Heavy Steel Riser Cutting. Acetylene Jl., vol. 28, no. 12, June 1927, pp. 561–562, 2 figs. Better steel castings can be made where oxyacetylene cutting torch is used for cutting risers.

OXYACETYLENE WELDING

Aluminum Sheets. Welding of Aluminum Sheets Used in the Construction of Pierce Arrow Bodies, F. E. A. Klein and G. C. Hoff. Am. Welding Soc.—Jl., vol. 6, no. 5, May 1927, pp. 34–36. Advantages of using oxyacetylene welding process in construction of automobile bodies made of aluminum sheets.

Applications. A Résumé of the Fields of Application of Oxy-Acetylene Welding and Cutting, D. S. Lloyd. Univ. of Toronto Eng. Soc.—Trans., Apr. 1927, pp. 38–48, 11 figs. Describes only those applications of process which have been very successful in reducing cost in the commercial field; deals with production, construction, repair, etc.

Cast-Iron Pipe. Welding Cast Iron Pipe. Acetylene Jl., vol. 29, no. 13, July, 1927, pp. 19–23 and 28. Investigation of bronze-welded lines shows need of careful laying procedure and desirability of expansion joints at 100-foot intervals.

Materials for. Selection of Materials for Welding, E. E. Thum. Am. Welding Soc.—Jl., vol. 6, no. 5, May 1927, pp. 38–43. For good results in oxyacetylene welding, as in any other activity, it is necessary to select raw materials on which to work; some low-carbon steels are not satisfactory for welding; these steels boil with more or less violence when melted under oxyacetylene flame, throwing off great many sparks at times.

Steel Furniture. Quality Steel Furniture Gas Welded. Acetylene Jl., vol. 28, no. 12, June 1927, pp. 554–557, 13 figs. Manufacturer of hospital equipment has developed welding as an essential process in production of strong and durable steel furniture.

Tanks. Oxyacetylene-Welded Construction of a Large High-Pressure Storage Tank, H. E. Rockefeller. Am. Welding Soc.—Jl., vol. 6, no. 5, May 1927, pp. 16–23, 12 figs. Construction of ethylene storage tank, constructed for Carbide and Carbon Chemicals Corp.; method of welding tank.

P

PAPER MACHINERY

Calender Rolls. Calender Rolls. Paper Trade Jl., vol. 84, no. 25, June 23, 1927, pp. 45–51, 13 figs. Roll grinding; measuring crown; amount of crown required; effect of heat on rolls; effect of water finishing and of rusting; grinding wheels.

Rubber-Covered Rolls. Rubber in Paper Machinery. India Rubber World, vol. 76, no. 4, July 1, 1927, pp. 190–192, 6 figs. Use of rubber-covered rolls.

Care and Study of Rubber Rolls. Paper Industry, vol. 9, no. 3, June 1927, pp. 419–422, 2 figs. Use of testing instruments to maintain uniform pressing.

Wire Cleaners. The Alexander-Youngchild Wire Cleaner, C. E. Youngchild. Paper Mill, vol. 50, no. 27, July 2, 1927, pp. 20–22. Details of mechanism for automatic and continuous scrubbing of paper-machine wire in order to keep the wire at all times free from spots of all kinds and eliminate troubles caused by pitch, grit and other foreign matter that is bound to accumulate on wire.

PATENTS

Simplifying Methods. Simplifying Methods of Procedure in United States Patent Office, L. W. Wallace. Soc. Indus. Engrs.—Bul., vol. 9, no. 5–6, May-June 1927, pp. 21–23. Recommendations of Committee on Patent Office procedure appointed by Secretary of Department of Interior to make thorough review of Patent Office, with view of simplifying method of procedure and expediting handling of applications for patents.

PATTERNMAKING.

Cost Reduction. How To Cut Pattern Costs, D. A. Hampson. Can. Machy., vol. 37, no. 25, June 23, 1927, p. 19. Method of obtaining patterns at low cost in plants that do not require services of patternmaker more than 25 per cent of time

Designing, Relation to. Patternmaker and Designer: Some Practical Notes on Their Relationship, B. Shaw. Mech. World, vol. 81, no. 2109, June 3, 1927, pp. 395–396. Discusses to what extent chief draftsman should supervise pattern shop.

PATTERNS

Equipment. Recommended Pattern Equipment. Foundry, vol. 55, no. 13, July 1, 1927, supp. data sheet. Marking gaged surfaces and locating points on patterns; markings indicating chilled surfaces and metal inserts; color ingredients of coating materials for marking patterns; pattern letters; loose pieces for pattern and core boxes; core prints for metal patterns.

Storage. The Arrangement of Pattern Shops (Die Einrichtung von Modellagerräumen), E. Berger Giesserei-Zeit., vol. 24, no. 6, Mar. 15, 1927, pp. 151–152, 4 figs. Points out disadvantages of unsuitable quarters; utilization of existing rooms by installation of suitable racks; describes reconstructed pattern shops.

PIPE, CAST IRON

Flanges. Cast-Iron Pipe Flanges and Flanged Fittings. Mech. Eng., vol. 49, no. 8, Aug. 1927, pp. 926–928. Tentative American standards for maximum working saturated steam pressures of 125 and 250 lb. per sq. in. (gage).

PISTON RINGS

Packing Action. Improved Ring Tester and the Packing Action of Piston Rings. Soc. Mech. Engrs. Japan—Jl., vol. 30, no. 121, May 1927, pp. 205–235, 6 figs. Deals with further researches carried on with ring tester developed by authors; number of tests made on sample pieces of piston rings shows how irregular pressures on cylinder wall are distributed. (In Japanese.)

PISTONS

Castings, Testing. Fluid Gage for Testing Concentricity of Piston Castings, C. F. Stein. Machy. (N. Y.), vol. 33, no. 12, Aug. 1927, p. 893, 1 fig. Each piston, first being turned, is tested with this gage, and if too much out of round it is scrapped.

Thermal Conductivity. Thermal Conductivity of Pistons, C. R. Butler and H. A. Huebotter. Oil Engine Power, vol. 5, no. 6, June 1927, pp. 399–400. Outline of principles of heat flow in piston design.

PRESSWORK

Blanking and Punching. Pressures for Blanking and Punching, C. W. Lucas. Forging-Stamping-Heat Treating, vol. 13, no. 4, Apr. 1927, pp. 129–131 and 143, 6 figs. Study of power required to overcome resistance to shearing; formula for calculating power necessary.

PULVERIZED COAL

Boiler Firing. Powdered Fuel and Its Effect on Boiler Plant Practice, W. J. Cotterell. S. African Inst. Elec. Engrs.—Trans., vol. 18, part 4, Apr. 1927, pp. 62–69. Reply to discussion of paper published in June issue of same journal.

Central Stations. The Use of Pulverized Fuel at the Big Sioux Station of the Sioux City Gas and Electric Company, K. M. Irwin. Mech. Eng., vol. 49, no. 7, July 1927, p. 763. Account of experiences since put into operation in June 1925.

Combustion and Furnace Design. Combustion of and Furnace Design for Powdered Coal, T. A. McGee. Paper Mill, vol. 50, no. 22, May 28, 1927, pp. 18 and 83–84. Selection and burning of coal, hydrocarbon, carbon and CO_2; combustion rates and furnace volumes; furnace water cooling.

Textile Mills. Ability of Pulverized Coal to Meet Varying Loads Is Factor of Importance to Textile Mills, C. I. Hubbard. Textile World, vol. 72, no. 1, July 2, 1927, pp. 71–76, 12 figs. Unit-system equipment, form and volume of furnace, ash disposal, efficiency tests, safety precautions.

Unit Mills. Pulverized Coal in the Middle West, E. H. Tenney. Mech. Eng., vol. 49, no. 7, July 1927, pp. 763–764. Experiences with unit mills.

PUMPS

Rural House. Rural House Water Works (Ländliche Hauswasserwerke), R. Vogdt. Fördertechnik u. Frachtverkehr, vol. 20, no. 3, Feb. 4, 1927, pp. 50–54, 14 figs. German types of small pumps; piston, centrifugal and rotary, operated by wind, gas or electricity; also types of installations, automatic, stopping, and starting devices, etc.

PUMPS, CENTRIFUGAL

Characteristics. Characteristics of Centrifugal Pumps, H. J. Meeker. Refrig. Eng., vol. 14, no. 1, July 1927, pp. 1–7 and (discussion) 7–8, 9 figs. Gives essence of what refrigerating engineer finds it valuable to know about centrifugal pumps; characteristics of pumps; effects of variables, head, speed, impeller diameter, as to selection of proper units in size and type and as to determination of what is to be expected of pump run under changed conditions; viscosity and kinds of materials are mentioned.

Suction Head. Suction Performance of Centrifugal Pumps (Untersuchungen über das Verhalten der Saugfähigkeit der Kreiselpumpen), M. Medici. Fördertechnik u. Frachtverkehr, vol. 20, no. 1, Jan. 7, 1927, pp. 3–6, 5 figs. By theoretical mathematical analysis, author derives new characteristic equation for maximum suction head; by pump test, values of coefficients of new formula are determined; tabulated

results for general use when approximate solution is sought.

Worthington. New Centrifugal Pumps Surpass Previous Efficiency Records, W. Schwanhausser. Eng. News Rec., vol. 98, no. 25, June 23, 1927, pp. 1015–1017, 3 figs. Detroit units show overall efficiencies of 84.7 per cent for 50-M. G. D. and 82.8 per cent for 70-M. G. D. unit; supplementary notes on Detroit pumps by W. C. Rudd.

R

REFRACTORIES

Slagging. Service Factors Governing Slagging of Boiler-Furnace Refractories, R. A. Sherman and E. Taylor. Power, vol. 66, no. 3, July 19, 1927, pp. 112–113. A.S.M.E. special research committee progress report deals with results of service tests on various types of furnaces burning several kinds of coal.

REFRIGERANTS

Carbon Anhydride. Carbon Anhydride as a Substitute for Ice (L'anhydride carbonique succédand de la glace hydrique), R. Villers. Nature (Paris), no. 2761, May 15, 1927, pp. 458–460, 2 figs. Points out that carbon anhydride, compressed or liquefied, is refrigerant which can replace ice; it is stored in steel bottles equipped with bronze valves.

Small Units, for. Comparison of Various Refrigerants for Small Units, J. R. Hornaday. Refrig. Eng., vol. 13, no. 12, June 1927, pp. 363–364. Items which must be considered in design of unit and in selection of particular refrigerant are total piston displacement per hour necessary to produce required refrigeration under same conditions of evaporator and condensing temperatures, and speed, efficiency, and stroke of compressor; presents chart giving comparison of various refrigerants.

REFRIGERATING MACHINES

Gas-Fired. The Gas-Fired Refrigerator, F. E. Sellman. Refrig. Eng., vol. 14, no. 1, July 1927, pp. 9–12, 6 figs. Deals with continuous-type machine made in United States particularly for application to domestic refrigerator box.

Household. The Household Machine from Engineering Standpoint, J. E. Starr. Ice & Refrigeration, vol. 72, no. 6, June 1927, pp. 564–565. Operating cost of small machines; analysis of performance of compression type, belt driven from electric motor; test record of well-constructed machines made by reliable manufacturers under favorable conditions with skilled attention.

REFRIGERATING PLANTS

Abattoirs. The National Refrigerating Plant of Callao (El frigorífico nacional de Callao), J. Colon. Ingeniería Internacional, vol. 15, no. 4, Apr. 1927, pp. 169–171, 2 figs. Description of refrigerated abattoir and storage house, giving details of wall insulation.

Bronx Terminal, New York City. Bronx Terminal Market Refrigerating Plant, A. C. Lescarboura. Power Plant Eng., vol. 31, no. 12, June 15, 1927, pp. 689–692, 5 figs. Municipal project of City of New York will be served by refrigerating plant, already installed, having many interesting design features.

Hotels. The New Stevens Hotel, Chicago, Illinois. Ice & Refrigeration, vol. 72, no. 6, June 1927, pp. 537–542, 6 figs. Particulars of various units of refrigerating equipment; process used for cooling water to serve in public rooms and 3000 guest chambers.

Welding. All Welded Refrigeration System. Welding Engr., vol. 12, no. 6, June 1927, pp. 31–32, 5 figs. Welding properly applied proves thoroughly reliable for fabrication of most intricate pipe shapes and assemblies.

REFRIGERATION

Packing Plants. Mechanical and Refrigerating Equipment for Model Packing Plant, J. M. Lenone. Refrig. World, vol. 62, no. 6, June 1927, pp. 17–18 and 26. Deals with improvements in boiler room, engine room, ammonia condenser, cooling tower, brine storage tank, etc.

Problems. Refrigeration Data and Problems. Power Plant Eng., vol. 31, no. 14, July 15, 1927, pp. 788–791, 2 figs. Balancing compressor power and condenser-water costs; liquefaction of CO_2; comparison of standard flow meters; moisture and heat transmission in insulating material. Abstract of paper presented before Am. Soc. of Refrig. Engrs.

ROLLING MILLS

Bearings. Anti-Friction Bearings on Roll Necks of Rolling Mills, E. C. Gainsborg. Iron & Steel Engr., vol. 4, no. 6, June 1927, pp. 274–276. There are certain outstanding advantages that use of anti-friction bearings offer, which are not had in plain bearings; these are control of gage thickness, brought about because of close tolerance to which ball and roller bearings are manufactured; speed of operation can be increased without undue heating.

Application of Tapered Roller Bearings on Roll Necks of Rolling Mills and Pinion Stands, F. Waldorf. Iron & Steel Engr., vol. 4, no. 6, June 1927, pp. 265–271, 8 figs. Results of tests on three-high 22-in. bar mill roughing stand which is used to roll alloy steel, results show possibility of very considerable savings in power by use of roller bearings.

Bearings for Use in Rolling Mills, C. J. Klein. Iron & Steel Engr., vol. 4, no. 6, June 1927, pp. 271–274, 5 figs. Simplicity of design in mounting of roller bearings is worthy of note; diagrammatical sketches giving idea of different mountings of mill-roll bearings.

Factors Governing the Design of Roller Bearings for Roll Necks, F. H. Buhlman. Iron & Steel Engr., vol. 4, no. 6, June 1927, pp. 302–307, 3 figs. Design of bearing; computation of stresses acting on bearing.

Rough Sheet and Tin Rolls. Rough Sheet and Tin Mill Rolls, W. R. Kneeland. Iron Age, vol. 120, no. 1, July 7, 1927, p. 13. "Tuesday" roughness explained as due to "crazing" of roll's surface; cause and remedies.

Sheet Mills. Exceeds Ton of Sheets Per Minute. Iron Age, vol. 119, no. 24, June 16, 1927, pp. 1731–1737 and 1792, 5 figs. Armco continuous mill at Ashland, Ky., is epoch-making as to productivity and unique in incorporating rolling principles established by special research; equipment for continuous production of sheet. See also description in Iron Trades Rev., vol. 80, nos. 24, 25, 26, and vol. 81, nos. 1 and 2, June 16, 23, 30, July 7 and 14, 1927, pp. 1532–1535, 1593–1596, 1656–1659, 8–12 and 67–70; and Mfrs.' Rec., vol. 91, no. 24, June 16, 1927, pp. 73–77.

Sheets Rolled to 16-Gage on Three-High Backup Mill, J. D. Knox. Iron Trade Rev., vol. 80, no. 26, June 30, 1927, pp. 1656–1659. Skew-type feed table and side guides enforce straight-line movement to piece in transit between stands.

Strip Mills. Rolling Stripsheets on New Continuous Mill, J. D. Knox. Iron Trade Rev., vol. 80, no. 20, May 19, 1927, pp. 1271–1275, 9 figs. Practice followed in manufacture of strip sheet by Columbia Steel Co.

RUBBER

Belt Conveyors. India Rubber and Its Production, Particularly for Band Conveyors in Germany and America (Kautschuk, seine Gewinnung und Verarbeitung insbesondere zu Bandförderern in Deutschland und Amerika), F. Druckenmüller. Braunkohle, vol. 26, no. 4, Apr. 23, 1927, pp. 81–92, 8 figs. Describes winning of raw rubber, vulcanizing and manufacture of conveyors and driving belts; illustrates use of such conveyors at various German mines and at Thyssen steel works for transportation of coke.

Manufacture. Compounding Troubles in Rubber Manufacture, E. B. Warren. Rubber Age, vol. 8, no. 4, June 1927, pp. 150–152. Deals with those variations and properties of ingredients not usually shown by laboratory examination, and with difficulties arising from interaction possible between several constituents of individual mixing, and of their action on rubber constituents themselves.

S

SAWS

Cutting Speeds. Sawing Sections, C. Steele. Mech. World, vol. 81, no. 2112, June 24, 1927, pp. 443–444, 13 figs. In addition to varying sections and given speed of cut, three other factors must be taken into consideration, as they affect feed proportionately; diameter of saw, depth of section and distance of traverse.

Hack. A Universal Hack-Saw Machine. Engineering, vol. 123, no. 3204, June 10, 1927, pp. 715–716, 4 figs. Striking features of machine constructed by R. Price & Sons, are revolving table and horizontal cross traverse; former enables work to be sawn at any angle; latter permits cuts to be made in succession.

SCREW THREADS

Standards. National Screw Thread Standards Compared, J. Gaillard. Am. Mach., vol. 67, nos. 4 and 5, July 28 and Aug. 4, 1927, pp. 147–149 and Aug. 4, 1927, 2 figs. Summary of present standard practice in United States, Austria, Belgium, Czechoslovakia, Finland, France, Germany, Great Britain, Holland, Italy, Japan, Sweden and Switzerland. Aug. 4: Manufacturing tolerances of National Standard (American), British Whitworth standard and German Whitworth standard threads; root clearance; tolerances on metric threads.

SHAFTS

Multiple-Splined. Torsional Strength of Multiple-Splined Shafts, C. W. Spicer. Soc. Automotive Engrs.—Jl., vol. 20, no. 6, June 1927, pp. 739–742, 6 figs. Results of tests show that torsional strength of multiple-splined shaft is considerably less than that of plain round shaft of diameter equal to base diameter of splined shaft; however, elastic limit of shaft supported by hub member, as in case of permanent fitting, is considerably higher than in shaft not so supported; dimensional details of specimens; stress-strain curves and brief discussion of results. See reference to previous article by author in Eng. Index, 1921, p. 473.

SHAPERS

Rapid-Traverse. Cincinnati Rapid-Traverse Shapers. Machy. (N. Y.), vol. 33, no. 12, Aug. 1927, p. 951, 1 fig. Advantages claimed are speed of operation and less effort on part of operator; rapid power traverse instantly shifts table to right position for next job and quickly moves work up to tool for cut.

SMOKE

Abatement. Smoke Abatement and Fuel Economy by Means of Organisation. Eng. & Boiler House Rev., vol. 40, no. 12, June 1927, pp. 620–621. Details have been translated from booklet giving particulars of organization in Germany, known as "Society for Utilization of Fuel and Smoke Abatement;" experience gained is instructive as showing what can be done by manufacturers supporting central advisory body on this problem.

Making a Drive on Smoke. Power, vol. 66, no. 5, Aug. 2, 1927, pp. 168–170, 2 figs. Nashville, Tenn., reports remarkable progress during first year in development of its program for smoke abatement and prevention.

SPEED REDUCERS

Caldwell. Caldwell Speed Reducer. Machy. (N. Y.), vol. 33, no. 11, July 1927, p. 874. Two separate drives, link-belt silent chain drive from motor or high-speed shaft, and cut spur-gear drive to low-speed shaft, are employed in speed reducer brought out by H. W. Caldwell & Son Co. See also description in Iron Age, vol. 120, no. 2, July 14, 1927, p. 81, 1 fig.

Manufacture. Manufacture Closely Controlled, R. A. Fiske. Iron Age, vol. 120, no. 5, Aug. 4, 1927, pp. 275–278, 9 figs. Machine-hours have been reduced 60 per cent and comparatively flat production curve is being maintained by the W. A. Jones Foundry & Machine Co., Chicago, by use of modern machine tools and closely controlled schedule for manufacture of standardized spur-gear reducers.

STANDARDIZATION

Policy and Procedure. Methods, Money, and Management, W. McClellan. Elec. World, vol. 89, no. 25, June 18, 1927, pp. 1325–1328. Standards are useful only to buyers and sellers; policy and procedure in national and international standardization; strengthening of Am. Eng. Standards Committee urged.

Progress. Ten Years of Standardization 1916–1926 (Tien jaren Normalisatie 1916—1926), B. M. Gratama. Ingenieur, vol. 42, no. 19, May 7, 1927, pp. 408–415, 2 figs. Organization of standardization work in Holland; financial report; list of standards published and in course of preparation.

STEAM

High-Pressure. Super-Pressure Steam and its Effect on the Economy of Generation, T. Roles. World Power, vol. 8, no. 43, July 1927, pp. 29–36, 4 figs. Higher steam pressures and temperatures.

Pressure-Reducing Valve. A Very Efficient Reducer Valve (Een zeer nauwkeurig werkende reduceerafsluiter), F. H. Vester. Ingenieur, vol. 42, no. 23, June 4, 1927, pp. 501–504, 5 figs. Valve for reducing steam pressure, patented and manufactured in Holland; it is claimed that reduced pressure is maintained practically constant, with maximum variation of 1 per cent irrespective of fluctuations in pressure or rate of flow of steam before entering valve.

STEAM ENGINES

Governing. Steam Demands Control Engine Operation C. H. S. Tupholme. Power Plant Eng., vol. 31, no. 14, July 15, 1927, pp. 778–779, 2 figs. New method of governing steam engines enables cut-off to be controlled either by electrical load or by demands for process steam as conditions demand.

Reciprocating. A New Type of Steam Engine, C. Commentz. Shipbldr., vol. 34, no. 202, June 1927, p. 331. Engine is of reciprocating type and is noteworthy on account of very low values of fuel and steam-consumption figures obtained.

Single-Cylinder Back-Pressure. Steam Engine Shows High Efficiency. Power Plant Eng., vol. 31, no. 13, July 1, 1927, p. 723, 2 figs. Single-cylinder back-pressure Hartman-Kerchove engine with piston valves was tested in German wool and linen-weaving plant; increased steam pressure, steam temperature, rotating and piston speeds made possible by improved design and construction enable this engine to meet modern industrial requirements of feed heating and exhaust-steam utilization more simply than engines with pressure-control systems.

Uniflow. Uniflow Marine Engine with Oil-operated Valve Gear. Engineer, vol. 143, no. 3728, June 24, 1927, pp. 676–679, 13 figs. Constructed by Sulzer Bros. for paddle-wheel steamer Helvétie; it is 3-cylinder engine developing 1500 b.hp.; old methods of lubrication have been replaced by centrally forced lubrication system.

STEAM GENERATORS

Brunler. Submerged Flame Combustion, E. K. Scott. Combustion, vol. 17, no. 1, July 1927, pp. 30–32, 2 figs. Development of Brunler plant at Hannover, Germany.

STEAM PIPES

Design. Modern Pipe-Work Design, G. H. Willett. Elec. Times, vol. 71, no. 1858, June 2, 1927, pp. 760–764, 13 figs. Deals with cast iron; steel castings; riveted pipes; welded tubes; weldless tubes; joints, welded-on and riveted-on flanges; welded joints; velocities; expansion; valves; drainage; insulation and corrosion.

STEAM POWER PLANTS

Block of Buildings for. A Successful Block Power Plant. Power, vol. 66, no. 1, July 5, 1927, pp. 19–20, 1 fig. Data on Cincinnati power plant supplying light, heat and power to block of buildings; during summer months energy is purchased from public utility and retailed.

Combined Heating and Power. A High-Pressure Power and Heating Plant in the Textile Industry (Eine Hochdruck-Heizkraftanlage in der Textilindustrie), W. Grossmann. Archiv für Wärmewirtschaft, vol. 8, no. 6, June 1927, pp. 165–169, 8 figs. Describes old plant and new high-pressure installation; steam distribution; storage by means of hot-water accumulators; results obtained showing economy of installations.

Design. Recent Developments in Power Plant Design, T. Roles. Elecn., vol. 98, no. 2557, June 3,

1927, pp. 605–609. Their effects on economy of generation; adoption of higher steam pressures and temperatures; preservation of furnace walls.

Diesel-Engined. The Private Diesel-Engine Generating Station. Oil Eng. & Technology, vol. 8, no. 4, Apr. 1927, pp. 145–147. Economical generation of electrical power by heavy-oil engines.

High-Pressure. High-Pressure Steam and Its Importance in National Economy (Il vapore ad alta pressione e la sua importanza per l'economic nazionale), G. Scavia. Ingeneria, vol. 6, no. 2, Feb. 1927, pp. 55–60, 6 figs. General discussion and technical description of steam plants of Snia Viscosa near Turin, and "La Soide Chatillon" at Vercelli; also entropy diagram.

High-Pressure Fittings. High-pressure Steam Fittings (Ueber Baustoffe und Konstruktionen von Armaturen für Höchstdruckkessel und Höchstdruck-Rohrleitungen), E. Widdel. Wärme, vol. 50, no. 11, Mar. 18, 1927, pp. 197–203, 15 figs. Requirements of fittings for high-pressure boilers and pipe lines with special reference to materials and constructional features for pressures exceeding 25 atmospheres; practical notes regarding experience with various makes of equipment; cast steel is material usually employed for such fittings, and author presents curves showing tensile strength, elastic limit, and extension of this material at temperatures from 20 to 500 deg. cent.; construction of number of typical stop valves, safety valves, gage glasses, quick-acting valves, etc.; precautions to be taken in supervising manufacture of high-pressure fittings. See brief translated abstract in Eng. & Boiler House Rev., vol. 40, no. 12, June 1927, p. 632.

India. Impressions of a Native Engineer in an Indian Power Plant, P. P. Talaty. Power, vol. 66, no. 1, July 5, 1927, pp. 11–12, 4 figs. Details of plant which generated power for cotton mill, with both steam and Diesel engines; operating record was equal to that of any corresponding American or European mill; in fact, fuel consumption of Diesel was better than that obtained in European tests.

Industrial. Operating Costs of Industrial Plants, C. S. Gladden. Power Plant Eng., vol. 31, no. 13, July 1, 1927, pp. 724–726. Cost comparisons and methods of reducing power-plant costs.

Power Plant of the Wolverine Shoe & Tanning Co., Rockford, Michigan, B. A. Parks. Power, vol. 66, no. 4, July 26, 1927, pp. 120–122, 4 figs. Plant supplies power, light, heat and process steam for manufacturing plant and serves as standby for village lighting; two 350-kw. d. c., single-cylinder condensing or non-condensing as dictated by process-steam demands; horizontal water-tube boilers fired by semi-automatic inclined-grate stokers and unit coal pulverizers.

Newspaper Plant. Newspaper Plant Has Many Automatic Features. Power Plant Eng., vol. 31, no. 12, June 15, 1927, pp. 666–668, 4 figs. Among many other things, automatic fire-protection system under supervisory control is interesting feature of Elverson Building plant in Philadelphia.

Oil-Engined. The "Watch Tower" Model Oil Engine Power Plant. Oil Engine Power, vol. 5, no. 6, June 1927, pp. 381–385, 8 figs. Bible and Tract Society uses oil-engine power exclusively in their publishing plant; plant auxiliaries; foundation and piping; cooling system.

Performance Data. Steam Plant Operation Data. Elec. West, vol. 58, no. 6, May 15, 1927, pp. 376–379, 11 figs. Heat balance; measurement of fuel oil. Prime Movers' Committee report to Pac. Coast Elec. Assn.

Pottery Plants. Pottery Plant Maintains 80 Per Cent Boiler Efficiency. Power Plant Eng., vol. 31, no. 14, July 15, 1927, pp. 764–768, 8 figs. Details of power plant of Onondaga Pottery Co. at Syracuse; two 300-hp. Connelly boilers supply steam for all process work in factory, as well as that used by engine for generation of electricity; boilers are fired by Westinghouse 3-retort stokers, both driven by Westinghouse $4^1/_2$ by 4-in. vertical engine.

Railway Terminal. Modern Power Plant Saves $150,000 a Year for Erie Railroad, C. F. McKinney. Power, vol. 66, no. 1, July 5, 1927, pp. 2–5, 4 figs. New plant at Jersey City terminal replaces six obsolete ones; steam is generated at 200 pounds and 100 degrees superheat; turbine and motor-driven unit pulverizers employed with one pulverizer per boiler; summary of 12 months' operation and maintenance experience.

University of Nebraska. University Heating and Power Plant, A. A. Luebs. Neb. Blue Print, vol. 26, no. 6, Apr. 1927, pp. 26 and 38. One 300-hp. Keeley, two 300-hp. Murray and two 500-hp. Heine water-tube boilers with horizontal baffles, equipped with Bayer soot blowers and Jones standard underfeed stokers; one 812-hp. Murray water-tube boiler, vertical baffle, equipped with Vulcan soot blower, and 8-retort Westinghouse underfeed stoker; coal is handled by home-made coal conveyor with cross drag and elevator.

Waste-Fuel-Burning. Steam for Power, Heat and Process Generated by Waste Fuel. Power, vol. 66, no. 2, July 12, 1927, pp. 42–44, 5 figs. Operation of new plant proves economical; full-capacity factory operation produces balance between waste fuel available and steam required; new plant occupies same space as old.

STEAM TRAPS

Design. Some Considerations of Steam Trap Design, R. W. Watts. Combustion, vol. 16, no. 6, June 1927, pp. 339–340. Perhaps principal difficulty is not so much failure of trap to remove condensate as failure to stop when condensate has been removed without permitting expensive losses of live steam; advantages of quick-action positively operating valve mechanisms.

STEAM TURBINES

Extraction. Calculating Performance of Extraction Turbines, B. M. Thornton. Power Plant Eng., vol. 31, no. 12, June 15, 1927, pp. 669–671, 2 figs. Steam requirements for stage feedwater heating by steam extracted from main unit can be easily found and thermal efficiency of cycle and increase in thermal efficiency over non-extraction cycle determined.

Guide Wheels. Strength of Semi-Circular Plates and Steam-Turbine Guide Wheels (Festigkeit halbkreisförmiger Platten und Dampfturbinen-Leiträder), Huggenberger. V.D.I. Zeit., vol. 71, no. 27, July 2, 1927, pp. 949–953, 16 figs. After referring to possibility of mathematical solution of strength problems of semi-circular plates, author describes tests carried out for determining deformed center surface and surface pressure; based on results of tests, practical methods are worked out for determining maximum deflection of semi-circular plates and guide wheels.

Foundations. Modern Steam Turbine Foundations, Dohme. Power, vol. 66, no. 5, Aug. 2, 1927, pp. 187–189, 5 figs. First problem to be considered is maximum centrifugal force; then, dynamic factor, that is to say, value by which maximum centrifugal force should be multiplied, must be determined; elimination of resonance; building ground question; danger of flowing groundwater; explanation of settling. Translated abstract from Siemens-Zeit., vol. 6, no. 6, Sept. 1926, pp. 458–466.

Modern. The Present Status of Steam-Turbine Construction (Der gegenwärtige Stand des Dampfturbinenbaues), E. A. Kraft. Zeit. des Oesterr. Ingenieur- u. Architekten-Vereines, vol. 79, no. 21–22, May 27, 1927, pp. 188–194, 10 figs. Thermodynamics of steam turbines; reviews recent German practice in design and construction of large condensing steam turbines with two or four casings, of capacity as high as 70,000 kw. and 3000 r.p.m.

Multi-Stage. The General Theory of Multi-Stage Steam Turbines (Studio sulla teoria generale delle turbine a vapore multiple), C. Colombi. Energia Elettrica, vol. 3, no. 12, Dec. 1926, and vol. 4, no. 1, Jan. 1927, pp. 1077–1087, and 82–95, 15 figs. Mathematical, graphical, and analytical study of fundamental principles of design and operation.

Oil Reconditioning. Is It Necessary to Renew Turbine Oil? S. S. Dougherty. Power Plant Eng., vol. 31, no. 13, July 1, 1927, pp. 721–723, 4 figs. System of turbine-oil reconditioning as used at Acme plant of Toledo Edison Co. proves satisfactory.

Stuffing Boxes. Stuffing Boxes for Steam Turbines. Eng. Progress, vol. 8, no. 5, May 1927, pp. 135–136, 3 figs. All drawbacks of old carbon and labyrinth packings are avoided by new corrugated spring packing manufactured by Gustav Huhn, of Berlin.

Test Corrections. Impulse Steam Turbine Test Corrections, S. B. Jackson. Elec. Times, vol. 71, no. 1858, June 2, 1927, pp. 764–766, 4 figs. Leaving losses; correction of pressure; temperature-variation correction; vacuum; speed and total correction.

STEEL

High-Temperature Plants. The Design of Plant for High-Temperature Service, R. W. Bailey. Engineering, vol. 124, no. 3208, July 8, 1927, pp. 44–46, 7 figs. Points out that there is extremely little information relation to stresses and temperatures at which plastic distortion will be ruling factor; but author indicates that there is room for more optimism in proceeding to higher temperatures than is generally thought to be the case. Paper read before Inst. Mech. Engrs.

STEEL CASTINGS

Flaws, Prevention of. Prevent Flaws in Steel Castings, J. L. Gibney. Foundry, vol. 55, no. 13, July 1, 1927, pp. 526–529, 19 figs. Cavities may exist in steel castings and never appear until casting fails under severe load or test; in writer's opinion introduction of nails affords most satisfactory solution to problem; reports from many sources indicate that chill nails are used extensively both in green-sand and dry-sand molds.

STEEL, HEAT TREATMENT OF

Annealing. Annealing of Hardened Steels (Die Vorgänge beim Anlassen gehärteter Stähle), L. Traeger. V.D.I. Zeit., vol. 71, no. 25, June 18, 1927, pp. 891–894, 7 figs. Measurement of longitudinal changes in hardened carbon steels with annealing; it is shown that process of annealing takes place in 3 separate stages which begin at about 100, 235 and 275 deg.; observed phenomena show that changes take place in steel which are explained; knowledge of the phenomena provide suggestions for heat treatment of steel.

Hardening. Hardening of Intricate Work, H. Simon. Machy. (Lond.), vol. 30, no. 765, June 9, 1927, p. 292. Author's practice in hardening of many intricate and expensive pieces, after experience had shown that ordinary hardening methods were not adequate; gas oven of pot type, with pot removed, was found preferable to other types; work was suspended at end of wire in center of oven; oven was started at black heat and temperature raised so gradually that if any part of work was seen to become heated even slightly faster than remainder, it was considered to be proof of defective heating.

Hardening and Tempering. The Decomposition of the Austenitic Structure in Steel, O. E. Harder and R. L. Dowdell. Am. Soc. Steel Treating—Trans., vol. 12, no. 1, July 1927, pp. 51–63 and (discussion) 63–68. Proposed theory for hardening and tempering of steels; theory discusses in addition to decomposition of austenite structure, reactions on heating steels above critical points, changes which take place while holding at temperature, changes which take place at various rates of cooling, and, finally, changes which take place on reheating hardened steels to various temperatures below critical for different lengths of time. Bibliography.

Quenching. A Neglected Phenomenon in Heat Treatment, B. Egeberg. Am. Soc. Steel Treating—Trans., vol. 12, no. 1, July 1927, pp. 46–50. Quenching temperature is generally determined in relation to critical point in heating; many chromium-nickel steels, however, show considerable difference between critical points; by quenching piece of steel, in which there is considerable difference between Ac and Ar points, at temperature close to Ar point rather than Ac point, advantages of lower quenching temperature are gained: maximum hardness and tensile strength with suitable elongation are obtained and it is believed that less dimensional change takes place and that hardening cracks may be eliminated.

Tools and Dies. Importance of Heat-Treatment in Tool Building, F. Waldo. Am. Mach., vol. 67, no. 4, July 28, 1927, pp. 151–154, 11 figs. Heat treatment of tools and dies at plant of Century Electric Co., St. Louis, Mo., is considered one of major functions of tool room; in laying out heat-treating room, three factors were considered: furnace equipment, method of recording heats accurately, and operating facilities.

STEEL, HIGH-SPEED

Cobalt. Properties of High-Speed Cobalt Steel (Eigenschaften kobaltlegierter Schnellarbeitsstähle), W. Oertel. Zeit. des Oesterr. Ingenieur- u. Architekten-Vereines, vol. 79, no. 17–18, Apr. 29, 1927, pp. 158–160. Tests of three sorts of steel with cobalt content, zero, 1.03 and 2.53 per cent, showed hardness and cutting power varying directly with cobalt content and hardening temperature; cost analysis shows that use of 5 per cent or 8 per cent cobalt steel in high-speed lathes will result in considerable economy.

STRUCTURAL STEEL

Torsional Fatigue. Torsional Fatigue Limits, T. H. Burnham. Engineering, vol. 124, no. 3208, July 8, 1927, pp. 33–34, 2 figs. Review of paper by Föppl published in V.D.I. Zeit., on Behavior of Structural Steel Under Repeated Torsional Stress.

SUPERHEATERS

Cochran Boilers. A New Superheater for Cochran Boilers. Engineer, vol. 144, no. 3731, July 1927, p. 78, 2 figs. New arrangement designed especially for use with vertical boilers with Cochran type.

T

TACHOMETERS

Centrifugal-Transmitter. Brown Centrifugal-Transmitter Tachometer. Machy. (N. Y.), vol. 33, no. 12, Aug. 1927, p. 959, 1 fig. Transmitter operates on inductance-bridge principle; various advantages are claimed for this method of measuring speed, it being pointed out that commutators and brushes used in electric tachometer generators are eliminated.

TEMPERATURE CONTROL

Automatic Apparatus. Automatic Temperature Control (Selbsttätige Temperaturregler), H. Illies. Archiv. für Wärmewirtschafts, vol. 8, no. 5, May 1927, pp. 149–151, 8 figs. Practical importance of temperature regulation and description of different methods and best-known control devices.

TESTS AND TESTING

Naval Experiment Station. U. S. Naval Experiment Station an Aid to Industry, H. C. Dinger. Power, vol. 65, no. 26, June 28, 1927, pp. 983–986. Station at Annapolis, Maryland, has been in operation since 1907; although its primary purpose is to perform testing work for Naval Bureau of Engineering, it also tests apparatus submitted by manufacturers to determine actual performance and to ascertain its suitability for use in Navy and other government service.

W

WELDING

Research. Welding Research, C. A. McCune. Am. Welding Soc.—Jl., vol. 6, no. 6, June 1927, pp. 39–45, 8 figs. Welding research as carried on in laboratory of Am. Chain Co. occupies attention of five distinct types of people in which are included the engineer, welder, metallurgist, chemist and physicist.

Steel Pipe. Welding of Steel Pipes (Schweissung von Stahlrohren), Schlee. Gas- u. Wasserfach, vol. 70, no. 22, May 28, 1927, pp. 501–508, 23 figs. General principles of welding in their application to pipe welding, particularly gas pipes; cost data show welded joints made at about half price of lead joints; protection of pipe joints.

Wire. Report of the Welding Wire Specification Committee, C. A. McCune. Am. Welding Soc.—Jl., vol. 6, no. 5, May 1927, pp. 44–50, 6 figs. Account of meeting of reorganized Welding Wire Specifications Committee called to determine in what manner, if any, present specifications can be made more rigid so as to further guarantee that welding wire purchased according to these specifications will be satisfactory.

WELDS

Red Shortness. The Red-Shortness of Weld Metal, A. H. Goodger. Welding Jl., vol. 24, no. 285, June 1927, pp. 166–169, 8 figs. Trouble is usually due to presence of certain impurities such as sulphur or oxygen, which may give rise to brittle films between grains; fractures are usually intergranular.

THE ENGINEERING INDEX

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Mechanical Engineering Section

THE ENGINEERING INDEX presents each month, in conveniently classified form, items descriptive of the articles appearing in the current issues of the world's engineering and scientific press of particular interest to mechanical engineers. At the end of the year the monthly installments are combined along with items dealing with civil, electrical, mining and other branches of engineering, and published in book form, this annual volume having regularly appeared since 1906. In the preparation of the Index by the engineering staff of The American Society of Mechanical Engineers some 1200 technical publications received by the Engineering Societies Library (New York) are regularly reviewed, thus bringing the great resources of that library to the entire engineering profession.

Photoprint copies (white printing on a black background) of any of the articles listed in the Index may be obtained at a price of 25 cents a page. When ordering photoprints identify the article by quoting from the index item: (1) Title of article; (2) Name of periodical in which it appeared; (3) Volume, number, and date of publication of periodical; (4) Page numbers. A remittance of 25 cents a page should accompany the order. Orders should be sent to the Engineering Societies Library, 29 West 39th Street, New York.

ABRASIVE WHEELS

American and German Types. Grinding Wheels (Ueber Schleifräder), C. Krug. Machinenbau, vol. 6, no. 14, July 21, 1927, pp. 696–701, 15 figs. Discusses production of grinding wheels, grinding stresses, recent American and German forms of grinding wheels, including the multiple-disk type of the Diskus-werken, Frankfurt a. M.

ACCELEROMETERS

Testing Apparatus. Accelerometer Testing Apparatus. Soc. of Automotive Engrs.—Jl., vol. 21, no. 2, Aug. 1927, pp. 121–126, 4 figs. Instrument uses rotating-weight method for obtaining harmonic motion.

ACCIDENT PREVENTION

Engineering and. Engineering—A Factor in Accident Prevention. Nat. Safety News, vol. 16, no. 2, Aug. 1927, pp. 37–40, 1 fig. No. 79 of the series of Safe Practices Pamphlets; reprints of this and other pamphlets of series are obtainable from the headquarters of the Nat. Safety Council in Chicago.

ACCIDENTS

Reduction of Cost of. The Way to Reduce the Cost of Accidents, L. P. Alford. Mfg. Industries, vol. 14, no. 2, Aug. 1927, pp. 121–124, 4 figs. Managers and executives must make safety a major responsibility and continuing care to reduce accident cost; this is conclusion and recommendation of special committee of the Am. Eng. Council which has made study of production and safety in industry.

AERODYNAMICS

Wind Tunnels. The New Aerodynamic Laboratory of the University of Toronto, J. H. Parkin. Eng. Inst. of Can.—Jl., vol. 10, no. 8, Aug. 1927, pp. 390–399, 16 figs. Description of laboratory with results of air-flow studies and power-consumption tests.

AIR

Properties of. Atmospheric Air in Relation to Engineering Problems, H. Eisert. Am. Soc. of Heat. & Vent. Engrs.—Jl., vol. 33, no. 8, Aug. 1927, pp. 459–465, 1 fig. Humidity calculations in engineering problems.

AIR COMPRESSORS

Tests. Tests of Low-Tension Air Compressors (Les essais de compresseurs d'air à basses pressions), M. L. Lahoussay. Revue de l'Industrie minérale, no. 158, July 15, 1927, pp. 293–305, 12 figs. Theoretical principles of compressor tests. Description of apparatus and procedure of testing efficiency, consumption of water and lubricating oil, and starting process of centrifugal and piston air compressors.

AIR CONDITIONING

Theaters. Air Conditioning in the Theatre, L. L. Lewis. Refrig. Eng., vol. 14, no. 2, Aug. 1927, pp. 55–60 and 88, 5 figs. Sets forth general, financial or economic considerations. Each item is considered with respect to cost, and for purposes of comparison, these costs are balanced against simple plan of ordinary ventilation.

AIRPLANE ENGINES

Friction of. Friction of Aviation Engines, S. W. Sparrow and M. A. Thorne. U. S. Natl. Advis. Com. for Aeronautics, Report No. 262, 1927, 27 pp., 32 figs. Discusses measurements of friction made in altitude laboratory of Bureau of Standards between 1920 and 1926, with reference to influence of speed, barometric pressure, jacket-water temperature, and throttle opening upon friction of aviation engines. Deals also with measurements of friction of a group of pistons differing from each other in a single respect, such as length, clearance, area of thrust face, location of thrust face etc.

Kinner. The Kinner Five Cylinder Air Cooled Engine. Aviation, vol. 23, no. 5, Aug. 1, 1927, pp. 251–252, 2 figs. Develops 100 hp. at 1800 r.p.m. and is designed for ease of maintenance and consistency of operation.

Lorraine-Dietrich. The Lorraine-Dietrich Aero-Engines. Aeroplane, vol. 33, no. 1, July 6, 1927, pp. 44–47, 3 figs. Lorraine engines now in regular production are of three models: 400-hp. 12-cylinder Vee engine, 450-hp. 12-cylinder "W" or "Broad Arrow" type, and 650-hp. 18-cylinder "W" engine; all these three types have three cylinders.

Packard "X." The New Packard "X" Engine. Aviation, vol. 23, no. 7, Aug. 15, 1927, pp. 358–360, 4 figs. Basis of design is two 12-cylinder water-cooled Packard V-1500 engines on one crankshaft; one inverted and one upright, developing 1250 hp. at 2700 r.p.m.

Revolution Recorder. Engine Revolution Recorder for Aeroplanes. Engineering, vol. 124, no. 3212, Aug. 5, 1927, pp. 168–169, 8 figs. Description of a mechanism used in the Imperial Airways machines which records on a chart engine speeds up to 2500 r.p.m.

Starting. Starting of Airplane Motors (Le démarrage des moteurs d'aviation), L. Poincaré. Revue industrielle, vol. 57, no. 2217, Aug. 1927, pp. 373–380, 2 figs. Historical review of starting devices and methods. Discussion of modern requirements and principles of starting mechanisms. A general calculation of force required for starting checked by tests on a number of French motors.

Superchargers. Preliminary Flight Tests of the N.A.C.A. Roots Type Aircraft Engine Supercharger, A. W. Gardiner and E. G. Reid. U. S. Nat. Advis. Comm. for Aeronautics, Report No. 263, 1927. From a consideration of very satisfactory flight performance of Roots supercharger and of its inherent advantages it is concluded that this type is particularly attractive for use in certain classes of commercial airplanes and in a number of military types.

AIRPLANES

Ailerons. The De Havilland Differential Aileron. Aeroplane, vol. 32, no. 26, June 29, 1927, pp. 774–778, 5 figs. Measure of effectiveness of aileron or other form of internal control can be measured by ratio between lateral righting couple or "rolling moment" and turning couple of yawing moment which it produces under any given circumstances; differential movement is secured purely and entirely by correct arrangement of angular relations between various members of aileron-operating mechanism, and not by mechanism that would otherwise be unnecessary; this is a very important advantage for weight.

Biplane Aerodynamics. Aerodynamics of the Biplane (Beiträge zur Aerodynamik des Doppeldeckers), N. K. Bose and L. Prandtl. Zeit. für angewandte Mathematik u. Mechanik, vol. 7, no. 1, Feb. 1927, pp. 1–9, 5 figs. Mathematical investigation of interaction between streamline curvature and two wings; theoretical results fairly checked by practical observations.

Control. The Mitten-Braley Airplane Control. Aviation, vol. 23, no. 2, July 11, 1927, p. 83, 2 figs. Demonstration made at Clover Field of device that allows sole occupant of plane to walk out on wing without disturbing equilibrium of airplane.

Curtiss Bomber. Curtiss Builds Largest All Metal Bomber. Aviation, vol. 23, no. 4, July 25, 1927, pp. 200–202, 3 figs. "Condor," twin-engine bomber gives fine performance before Army Corps officials at Mitchell Field, L. I.

Driggs. Driggs Aircraft Corp. Design New Plane. Aviation, vol. 23, no. 2, July 11, 1927, p. 87, 1 fig. New Driggs Dart II, light plant, combination of light weight and stability makes for easy handling by pilots of limited experience.

Flying Boats. See FLYING BOATS.

Fokker. Byrd and Maitland Planes Alike in Design. Aviation, vol. 23, no. 2, July 11, 1927, pp. 74–76, 7 figs. Both were built in series of six transports by Atlantic Aircraft Corp., and differ from each other in installation of special fuel tanks and navigating equipment.

The New Fokker Army Bomber. Aviation, vol. 23, no. 9, Aug. 29, 1927, p. 473. Of conventional Fokker construction; carries crew of five men and is powered with two Pratt & Whitney Wasp engines.

Gloster "Goral." The Gloster "Goral," Bristol "Jupiter," or Siddeley "Jaguar" Engines. Flight, vol. 19, no. 30, July 28, 1927, pp. 519–521, 6 figs. Description of an all-steel biplane.

Long-Range Flight. Long-Range Flight of Airplanes (Sur le vol horizontal d'un avion à grand rayon d'action), M. J. Vorobeitchik and M. P. Painleve. Academie des Sciences—Comptes Rendus, vol. 184, no. 9, Feb. 28, 1927, pp. 514–516. Discusses mathematically optimum conditions for horizontal flight of long-range airplane; certain simplifying assumptions are made, and an expression is found relating consumption with other factors involved.

Royal Air Force Display, England. New Machines in the R. A. F. Display. Aeroplane, vol. 32, no. 26, June 29, 1927, pp. 768–772, 11 figs. Brief descriptions and illustrations of all new types of aircraft taking part in Display. See also vol. 33, no. 1, July 6, 1927, pp. 5–7 and 9 pp. between 10 and 37, giving account of display and including impressions by W. H. Sayers.

Seaplanes. See SEAPLANES.

Spinning of. Tail Spins and Flat Spins, E. V. Korvin-Kroukovsky. Aviation, vol. 23, no. 3, July 18, 1927, pp. 152–157, 6 figs. Deals with shape and arrangement of the wings affecting speed and range of autorotation; with effect autorotation produces on balance and controllability of air plane.

The Spinning of Aeroplanes, L. W. Bryant. Roy. Aeronautical Soc.—Jl., vol. 31, no. 199, July 1927, pp. 619–681 and (discussion) 681–688, 31 figs. History of spinning problem; consideration of geometry and mechanics of steady spin; in first section, assuming that airplane can be held in steady spiral motion at large mean angle of incidence, authors analyze in geometrical terms airplane's attitude and examine balance of force; they examine various component

NOTE.—The abbreviations used in indexing are as follows:
Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

couples which arise and endeavor to suggest how balance of couples is maintained.

Stout. The Stout Twelve Passenger Air Transport. Aviation, vol. 23, no. 4, July 25, 1927, pp. 204–205, 4 figs. Built entirely of duralumin, powered by three engines and has cruising radius of 500 miles.

Windmill Power Generator. The Marconi-Newton Constant-Speed Windmill. Flight, vol. 19, no. 28, July 14, 1927, pp. 486–487, 1 fig. New electric power generator for aircraft; new patent windmill solves problem of constant speed by careful application of scientific principles carried out in a mechanically first-class way.

Wings. Air Force and Moment for N-20 Wing with Certain Cut-Outs, R. H. Smith. Nat. Advisory Committee for Aeronautics—Report, no. 266, 1927, 12 pp., 4 figs. Experimental results of tests on six 5 by 30-inch N-20 wing models, cut out or distorted in different ways, which were conducted in 8 by 8-ft. wind tunnel of Navy Aerodynamic Laboratory in Washington in 1924.

ALLOYS

Aluminum. See ALUMINUM ALLOYS.

Bearing Metals. See BEARING METALS.

Copper. See COPPER ALLOYS.

Corrosion-Resistant. Selection of Corrosion Resistant Alloys, W. M. Mitchell. Forging—Stamping—Heat Treating, vol. 13, no. 6, June 1927, pp. 204–207. Discusses mechanism of corrosion together with factors involved and reviews modern practice in combating destruction of metals.

ALUMINUM ALLOYS

High-Strength. Light Alloys [Quelques précisions à propos du K. A. (Koltchoug-aluminium)]. Aérotechnique, vol. 9, no. 96, May 1927, p. 145. Aluminum high-strength light-weight alloy manufactured in Russia; composition is as follows: copper 4.5 per cent, manganese 0.6 per cent, nickel 0.3 per cent, magnesium 0.5 per cent, aluminum 93.5 per cent; metal is used in annealed or drawn-back state for pressed work, normally quenched for sheared work and riveting; cold-worked for shearing, riveting and high-strength purposes; highest and best temperature from which to quench is 520 deg. cent. See brief translated abstract in Automotive Abstracts, vol. 5, no. 7, July 20, 1927, p. 218.

Industrial Uses. Industrial Utilization of Aluminum Alloys (A propos de l'utilisation industrielle des alliages d'aluminium), H. Pommerenke and P. Herman. Revue de Métallurgie, vol. 24, no. 6, June 1927, pp. 297–306, 6 figs. Discusses following questions: What is best light alloy to meet requirements of many industries, particularly automobile and motorcycle industry; what heat treatment is most desirable for this alloy from point of view of efficiency and cost.

Intermediate Hardeners. Intermediate Aluminum Alloys (Hardeners) for Use in Preparing Light Aluminum Alloys, R. J. Anderson. Am. Metal Market, vol. 34, no. 137, July 16, 1927, pp. 4–7, 25 figs. Intermediate aluminum alloys are used extensively in practice as vehicles for making fixed additions of metals to aluminum in preparation of light alloys; in foundry parlance, intermediate alloys are usually referred to as "hardeners" or "rich alloys;" list of intermediate alloys and properties; preparation; microstructures.

Tensile Tests. Grooved and Uniform Expansion with Tensile Tests (Uber Einschnür und Gleichmassdehnung beim Zugversuch), O. Tiedemann. Zeit. für Metallkunde, vol. 19, no. 6, June 1927, pp. 249–252, 1 fig. Numerical relations between total, grooved and uniform expansion; effect of aging on both kinds of expansion in the case of certain aluminum-zinc alloys.

AMMONIA COMPRESSORS

Turbo-Compressors vs. Piston Compressors. High-Capacity Refrigerator Compressors (Kompressoren für grosse Kälteleistungen), H. Voigt. V.D.I. Zeit, vol. 71, no. 33, Aug. 13, 1927, pp. 1145–1153, 25 figs. Comparative description and discussion of characteristics and economy of operation of the world's two largest compressors, The Sulzer piston compressor of 3.5 million kg-cal. per hr. and the Brown-Boveri turbo-compressor of 6 to 8 million kg-cal. per hr.; greater economy of turbo-compressors for heavy duty installations due to much lower initial cost and to requiring only 1/3 of floor space needed for piston compressor; indicated possible use of turbo compressors in ammonia synthesis and gas supply systems; properties of refrigerants.

ARTILLERY

Anti-Aircraft. Some Random Thoughts on Anti-aircraft Artillery, P. D. Bunker. Coast Artillery Jl., vol. 67, no. 1, July 1927, pp. 5–17, 2 figs. Observations made as result of several years spent in more or less close connection with anti-aircraft artillery.

ASH HANDLING

Pneumatic. Recent Progress in Pneumatic and Steam Jet Ash Handling, J. Adams. Indus. Mgmt. (N. Y.), vol. 74, no. 2, Aug. 1927, pp. 125–128, 6 figs. Advantages and limitations.

AUTOGENOUS WELDING

Aluminum Alloys. Autogenous Welding of Aluminum Alloys Employed in Automobile Construction (Soudure autogene des pieces en alliages d'aluminium employee en construction automobile), J. Bert. Revue de Métallurgie, vol. 24, no. 6, June 1927, pp. 337–344, 3 figs. Results of mechanical tests; influence of preparation of pieces, of temperature and of composition of metal, and of heat treatment and cold working.

AUTOMOBILE ENGINES

Acceleration Tests. Engine-Acceleration Tests, J. O. Eisinger. Soc. of Automotive Engrs.—Jl., vol. 21, no. 2, Aug. 1927, pp. 184–190 and (discussion) 190–192, 12 figs. Calculation of theoretical acceleration is explained; description of first series of engine tests, consisting of comparison of maximum acceleration obtained with three different carburetors used without accelerating wells, is included; series of tests were made, using one of these carburetors, to ascertain effects of changing jacket-water temperature alone; somewhat similar set of tests was made in effort to determine effect of intake-manifold temperature, and results are presented; effect on performance injecting various amounts of accelerating charge was determined also for each of carburetor adjustments; engine tests made recently in attempt to determine cause of leaning of mixture when throttle is opened suddenly are analyzed, as well as subject of flow of liquid fuel along intake-manifold wall; methods of determining moment of inertia are presented in Appendix.

Cozette. Cozette Builds Vertical Four-Cylinder Two-Stroke Engine, W. F. Bradley. Automotive Industries, vol. 57, no. 5, July 30, 1927, pp. 168–169, 3 figs. Has bore and stroke of 2.2 in. and output is around 100 hp.; two crankshafts connected by spur pinions; piston and cylinders aluminum; designed for racing.

Delage. Delage Adopts L-Head Engine for New Six-Cylinder Car, W. F. Bradley. Automotive Industries, vol. 57, no. 6, Aug. 6, 1927, pp. 183–185, 1 fig. Latest model of French builder unites best qualities of American design with finest in European practice; flexibility and acceleration are features.

Lubrication. Oil-Flow through Crankshaft and Connecting-Rod Bearings, D. B. Brooks and S. W. Sparrow. Soc. of Automotive Engrs.—Jl., vol. 21, no. 2, Aug. 1927, pp. 127–134, 12 figs. Paper is limited to discussion of factors governing flow of lubricant through crankshaft and connecting-rod bearings; apparatus for measuring flow is described, and fact that it permits measurement under operating conditions is emphasized; results obtained by increasing main and connecting-rod bearing clearances are enumerated first; paper then treats of influence of engine-speed.

Piston Speed. The Quest for Higher Piston Speeds, P. M. Heldt. Automotive Industries, vol. 57, no. 5, July 30, 1927, pp. 152–155, 1 fig. Striking proper balance between performance and endurance is problem confronting manufacturers of moderate-priced cars.

Semi-Diesel. Semi-Diesel Type Engine Designed for Passenger Vehicles. Automotive Industries, vol. 57, no. 9, Aug. 27, 1927, pp. 294–295. Development of European engineer makes good showing on Citroen model B-12 chassis in recent test; two-cylinder, two-stroke type and is valveless; starts on gasoline.

Sleeve-Valve. Sleeve-Valve Liveliness. Autocar, vol. 59, no. 1654, July 15, 1927, pp. 137–138, 5 figs. Speed, silence, and flexibility features of 16–50 hp. six-cylinder Voisin. Four-wheel brakes, overall length, 14 ft., 7 in., wheelbase, 10 ft., 6.5 in.

AUTOMOBILE MANUFACTURING PLANTS

Citroen Company, France. Development of the Citroen Company, H. H. Kelly. Commerce Reports, no. 29, July 18, 1927, pp. 135–139, 5 figs. Europe's leading automobile manufacturer employs American machinery and practices.

Mass Production. Excels in Mass Production, F. L. Prentiss. Iron Age, vol. 120, no. 5, Aug. 4, 1927, pp. 261–266, 7 figs. New Pontiac works outstanding example of close coördination of straight-line operations with materials-handling equipment.

AUTOMOBILES

Assembly. Assembly of the Marmon "8," F. H. Colvin. Am. Mach., vol. 67, no. 4, July 28, 1927, pp. 143–146, 9 figs. Assembling various units, including engine and its test stand, on cross-assembly lines that feed chassis assembly at proper point.

Audi. The 18/70 Audi Six (Der 18/70 PS Audi-Sechszylinder-Personenwagen). Motorwagen, vol. 30, nos. 14 and 19, May 20 and July 10, 1927, pp. 332–335 and 429–437, 13 figs. Car has been conceived as quality product; engine has detachable head and one overhead camshaft, driven by vertical shaft at flywheel end; cams acts directy on flat caps of valve stems; connecting rods are drilled hollow; crankshaft is of large diameter with large hollow throws and counterweights on all crank arms; double Zenith carburetor is used; Thermoid-Hardy type joints are arranged both before and behind gear set to deaden noise.

Bodies. Body Design Progress an Outgrowth of Improved Construction, G. Mercer Automotive Industries, vol. 57, no. 6, Aug. 6, 1927, pp. 192–195, 5 figs. Changes in design leading to more pleasing effects generally due to development of new methods and materials which give builder more latitude in his work.

New Type of Aluminum Body Built for All-Aluminum Chassis. Automotive Industries, vol. 57, no. 5, July 30, 1927, pp. 165–166, 2 figs. No wood used in construction; design incorporates number of distinctive features; development is made possible by new alloys and modern welding practice.

Brakes. Dynamometer Test of Brake-Drum Heat in Dual Wheels, C. W. Bedford and E. Blaker. Soc. of Automotive Engrs.—Jl., vol. 21, no. 2, Aug. 1927, pp. 160–169 and (discussion) 169–170, 15 figs. Effect of brake-drum heat on tire temperatures under known conditions of brake-horsepower input; report of 3 months' tests.

The Problem of Brake Adjustment, F. W. Parks. Automotive Mfr., vol. 49, no. 4, July 1927, pp. 21–24. A thoughtful and thorough summary of whole braking problem; advantages and disadvantages of various forms; proper testing.

Bugatti. The Two-Litre Straight-Eight Bugatti. Auto-Motor Jl., vol. 32, no. 29, July 21, 1927, pp. 609–611, 11 figs. Latest example of famous French car; three valves per cylinder; overhead camshaft; synchronized carburetors; special springing system.

Franklin. The 25.3 H.P. Air-Cooled Franklin. Auto-Motor Jl., vol. 32, no. 31, Aug. 4, 1927, pp. 645–647, 7 figs. Cooling system most noticeable feature; blower fan in front, direct on engine crankshaft, and acting as auxiliary flywheel; forces air under considerable pressure into air duct leading up front of engine into cowl, which encloses cylinder heads, where air is directed to hottest part of each cylinder and forced down through copper cooling ducts.

Front-Wheel Shimmy. Tires as a Cause of Shimmy, K. L. Hermann. Soc. of Automotive Engrs.—Jl., vol. 21, no. 2, Aug. 1927, pp. 135–145, 4 figs. Various interrelated movements of front end of car that are commonly known as automobile shimmy; long list is given of experiments made in an attempt to correct trouble.

Headlights. Automobile Headlights (Constitution et alimentation des phares d'automobiles), Industrie Electrique, vol. 36, no. 841, July 10, 1927, pp. 295–504, 13 figs. Deals with following problems: optic projection, importance of standard beam of light, study of lamps, anti-glare devices, lighting of routes and visibility, etc.

Hudson. New Hudson Cylinder Head Design Increases Compression Ratio. Automotive Industries, vol. 57, no. 3, July 16, 1927, pp. 79–80, 4 figs. Arrangement claimed to make operation possible without use of anti-knock gasoline.

Hydraulic Washing. Hydraulic Car Washing. Motor Transport, vol. 45, no. 1167, July 25, 1927, pp. 113–114, 3 figs. How all-round economy is effected by B.E.N.-Myers high-pressure mist system.

Mercédès. The 16–50 H.P. Mercédès Car. Auto-Motor Jl., vol. 32, no. 27, July 7, 1927, pp. 563–565, 10 figs. New two-liter model with six cylinders; unit construction; fully automatic chassis lubrication.

Schneider. The 13–55 H.P. TH. Schneider. Auto-Motor Jl., vol. 32, no. 28, July 14, 1927, pp. 585–587, 9 figs. Two-liter type with overhead valves.

6-Wheel. Six-Wheel Design, P. M. Heldt. Automotive Industries, vol. 57, no. 6, Aug. 6, 1927, pp. 198–205, 12 figs. Many vehicles of this type now in production; state laws have sped development.

Speed Changers. Trogen-Montalembert Speed Changer (Le changement de vitesse par engrénages épicycloidaux système de Trogon Montalembert). Pratique des Industries Mécaniques, vol. 10, no. 3, June 1927, p. 106, 2 figs. In this device five forward speeds and two reverse can be obtained with only one main gear and two pinions; it is of planetary types but differs from other similar devices, such as Ford by its ability to give more speeds. See translated abstract in Mech. Eng., vol. 49, no. 8, Aug. 1927, pp. 915–916.

AUTOMOTIVE FUELS

Benzol. See BENZOL.

Filtering. Filtering the Fuel, C. T. Schaefer. Bus Age, vol. 7, no. 5, May 1927, pp. 21–24 and 30, 10 figs. The use of fuel filters on motorbus engines and why their use is recommended; various devices and their construction and operation.

AVIATION

Airports. Recent Developments of Municipal Airports in the West, D. R. Lane. Am. City, vol. 37, no. 1, July 1927, pp. 1–5, 5 figs. San Diego airport; San Francisco temporary flying field; Oakland site; Santa Monica's field; Portland project.

Commercial. Service Aviation, Aeronautical Engineering and Commercial Aviation, E. P. Warner. Soc. of Automotive Engrs.—Jl., vol. 21, no. 2, Aug. 1927, pp. 151–154. Discusses general question of desirability of specifically commercial type of airplane engine that shall be less refined and less expensive than military types and indicates that safety, reliability and economy are objectives of commercial aviation.

Germany. Air Traffic in Germany, M. Wronsky. Roy. Aeronautical Soc.—Jl., vol. 31, no. 199, July 1927, pp. 690–704 and (discussion) 704–714. Historical view; German Luft Hansa; subsidy; airplanes for civil aviation and their construction; metal propellers; control and engines; instruments, accomodation and comfort; pilots and their training; results in traffic; insurance; structure of aerial net and political outlook; international air traffic association, I.A.T.A., a society of air traffic companies of almost all European states; geographical position.

B

BALANCING MACHINES

Vibration, Elimination of. Dynamic Balancing of Rotating Parts, D. Mitchell Duncan. Can. Machy., vol. 38, no. 3, July 21, 1927, pp. 11–13, 5 figs. Discussion of importance of perfect balancing of rotating parts in the elimination of vibration, and explanation of operation of precision balancing machines.

BEARING METALS

Thermit. Bearing Metals, Particularly "Thermit" (Etwas über Lagermetalle, speziell "Thermit"), Maschinen-Konstrukteur, vol. 60, no. 8, Apr. 30, 1927, pp. 192–194, 7 figs. Comparative metallographic study of "Thermit" and other bearing metals, including hardness tests, behavior under operating conditions, etc.; demonstrates physical and economic superiority of "Thermit."

BEARINGS

Anti-Friction. Recent Developments in the Application of Anti-Friction Bearings to Machine Tools, R. F. Runge. Mech. Eng., vol. 49, no. 9, Sept. 1927, pp. 955–958, 7 figs. Illustrations of a variety of designs; importance of proper lubrication and methods of preventing the accumulation of dust in bearings.

Electric-Motor. An Analysis of the Motor Bearing Problem, F. W. Cramer. Iron & Steel Engr., vol. 4, no. 7, July 1927, pp. 329–332. Advantages of sleeve bearings; shows that sleeve bearings collectively, both in mill manufacture and maintenance, do not make fair comparison with factory-made precision anti-friction bearing, but from operating standpoint, their simple construction and ease of fabrication by average mechanic, are form of insurance against long delays when one fails and spare is not at hand; and also enable mills to carry comparatively low inventory of bearings and bearing material.

BELT DRIVE

Idlers. Fixed and Flexible Idlers on Leather Belt Drives, R. C. Moore. Indus. Engr., vol. 85, no. 7, July 1927, pp. 310–313, 6 figs. When idler drives are laid out properly and equipped with suitable belts, not only is belt life as long as that on open drive but maintenance and cost of operation are considerably less.

Influence of Pulley Diameter. Influence of Pulley Diameter on Power Transmitted by Leather Belt Drives, R. C. Moore. Indus. Engr., vol. 85, no. 8, Aug. 1927, pp. 357–359, 4 figs. Data on minimum pulley diameters for belts transmitting given horsepower.

Slip. Angular Slip of Pulleys and Slip of Tight and Slack Sides of Driving Belts (Sur le glissement angulaire des poulies et le glissement des brins menant et mené de la courroie), M. Swyngedauw. Académie des Sciences—Comptes Rendus, vol. 183, no. 26, Dec. 1926, pp. 1329–1333. Reports results of numerous experiments showing that pulley slip is always greater than belt slip.

BELTING

Tighteners, Theory of. Adjusting and Loading of Tightening Pulleys (Spannrollenanordnung und Spannrollenbelastung), Laudien. Werkstattstechnik, vol. 21, no. 8, Apr. 15, 1927, pp. 217–219, 6 figs. Mathematical analysis of belt tension and belt tightening, showing harmful effects of misplaced belt tighteners; derives formulas and curves for belt-tightening pulleys.

BENZOL

Utilization as Fuel. Benzol, Its Utilization as Fuel (Le benzol et son emploi comme carburant), M. Bihoreau. Annales de l'Office National des Combustibles Liquides, no. 2, June 1927, pp. 281–308. Notes on different solutions proposed for fuel purposes; available resources; benzol and its mixtures.

BLAST FURNACES

Flue Dust and Control. Blast Furnace Flue Dust and Blast Furance Control, E. Kieft. Iron & Steel Engr., vol. 4, no. 7, July 1927, pp. 345–348, 3 figs. Makes calculations pertaining to cause of flue-dust production; importance of necessary height between stock level and center of downcomers is calculated with consideration of prevailing conditions encountered in practical operation.

Losses in Air Ducts. Calculation of Losses in Air Ducts in Blast Furnaces (Calcul des pertes de charge dans les conduites à vent des hauts-fourneaux), M. Derclaye. Revue de Métallurgie, vol. 24, nos. 5 and 6, May and June 1927, pp. 237–254 and 317–330, 14 figs. Determination of loss in rectangular element in circular duct; influence of operating conditions; applications to different types of furnaces.

BLOWERS

Diffuser Design. Diffusers of Centrifugal Blowers (Die Diffusoren der Schleudergebläse), R. Karg. Maschinen-Konstrukteur, vol. 60, no. 2, Jan. 31, 1927, pp. 39–42, 4 figs. States principles of their design and gives illustrative numerical examples.

Forced-Draft vs. Suction. The Use of Fans for Increasing Draft in Heating Plants (Emploi des ventilateurs pour renforcer le tirage des installations thermiques), F. Prothais. Chaleur & Industrie, vol. 8, no. 87, July 1927, pp. 386–394, 2 figs. Deals with suction blowers and forced-draft blowers and comparison of two systems.

BOILER FEEDWATER

Priming. The Priming of Saline Waters, A. F. Joseph and J. S. Hancock. Chemistry & Industry, vol. 46, no. 30, July 29, 1927, pp. 315t–321t, 5 figs. Investigations described in this paper were designed to ascertain causes and prevention of priming in locomotive boilers, this being particularly important problem in those parts of the world where supply of water for locomotive steam raising is not only very bad quality, but also limited in quantity.

Purification. The Purification of Water for Boiler Feed Purposes, T. R. Duggan. Eng. Inst. Canada—Jl., vol. 10, no. 8, Aug. 1927, pp. 379–385, 6 figs. Review of the various methods of water purification. Paper read before Montreal Branch of the Engineering Inst. of Canada, March 10, 1927.

Testing. Lime-Soda Diagram as Aid in Feedwater Treatment (K-S-Wasserdiagramm als Hilfsmittel bei der Wasserpflege), I. W. Arbatsky. Wärme, vol. 50, nos. 19 and 20, May 13 and 20, 1927, pp. 329–335 and 349–353, 10 figs. Criticizes present-day criterion based on hardness of water, saying it leads to wrong results and gives no suggestion as to method of purification; presents new criterion based on lime-soda relationship, also diagrams for solving problem of this kind and describes special apparatus designed for testing waters on basis of new criterion.

Treatment. Boiler-Feedwater Problems and Methods of Treatment, S. T. Powell. Mech. Eng., vol .49, no. 9, Sept. 1927, pp. 1009–1012. Paper constitutes a brief survey of the methods employed in treatment of boiler feedwater for removal of suspended solids, the elimination of scale-forming salts, purification of make-up by evaporation, and the removal of non-condensable gases for prevention of corrosion; continuous blow-down systems and electrolytic scale-prevention appliances are discussed briefly; phenomena of priming and foaming are also touched upon; the paper concludes with a statement of work of Boiler Feedwater Studies Committee, of which the author is chairman.

Preliminary Purification of Boiler Feedwater (L'épuration préalable de l'eau d'alimentation des générateurs), M. J. Guth. Assns. Françaises de Propriétaires d'Appareils à Vapeur—Bul., no. 28, Apr. 1927, pp. 136–146, 5 figs. Discusses elimination of scale-forming salts and other harmful elements from feedwater before it enters boiler; physical, chemical and combined physico-chemical process.

Zeolite Water Treatment in a Large Central Heating Plant, A. H. White, J. H. Walker, E. P. Partridge and L. F. Collins. Am. Water Works Assn.—Jl., vol. 18, no. 2, Aug. 1927, pp. 219–224 and (discussion) 244–249, 9 figs. Zeolite water treatment system in the Beacon Street heating plant of the Detroit Edison Co.; results of some extensive preliminary laboratory investigations, carried on at University of Michigan, to determine possibilities of removal of carbon dioxide from zeolite-treated water by means of sulphuric and phosphoric acids; actual operating results are also included.

BOILER FURNACES

Küma Grate. The Küma Grate (Die Küma Feuerung), Spindler. Wärme, vol. 50, no. 22, June 3, 1927, pp. 379–383, 9 figs. It is so arranged as to have a big wave-like motion, due to which individual coal particles reach first peak only to roll next into trough; velocity of advance of coal depends only on stroke of device and number of wave oscillations both of which are adjustable within wide degrees; it is plain that in two years of operation there was scarcely a case when nozzle plate had to be replaced because of wear or clogging by clinkers; results of tests. See translated abstract in Mech. Eng., vol. 49, no. 9, Sept. 1927, p. 1021.

BOILER PLANTS

Instruments. Operation and Control of Boiler Rooms (Le rôle des analyseurs, des debitmètres, des pyromètres et des pressiodeprimomètres), M. Bouffart. Revue Universelle des Mines, vol. 15, no. 2, July 15, 1927, pp. 49–66, 6 figs. Discusses instruments essential to boiler room, including analyzers, discharge meters, pyrometers and pressure-reduction meters.

BOILER PLATES

Bending Machines. Progress in Construction of Heavy Electrically Operated Machines for Bending Boiler Plates (Fortschritte im Bau schwerer elektrisch angetriebener Blechbiegemaschin), F. Puppe. Zeit. des Bayerischen Revisions—vereins, vol. 31, no. 11, June 15, 1927, pp. 122–125, 9 figs. Describes recent Schiess-Defries A.G. vertical machines of three and four bending rolls enabling completion of bending in one operation.

Strength Properties. Strength Properties of Boiler Plates at Temperatures of 20 to 600 deg. cent. (Festigkeitseigenschaften von Kesselblechen bei Temperaturen von 20 bis 600°), G. Urbanexyk. Stahl u. Eisen, vol. 47, no. 27, July 7, 1927, pp. 1128–1135, 11 figs. Results of strength tests for four types of plates conforming to new specifications for land-type boilers.

BOILERS

Coke-Fired. Coke-Fired Steam Boilers, E. W. L. Nicol. Gas Engr., vol. 43, no. 615, July 1927, pp. 177–178. Draft required for gas coke; mechanical stoking; utilizing low-grade coal; coke-fired power stations.

Combustion. Principles of Combustion in Modern Steam Boiler Practice, D. L. Fagnan. Nat. Engr., vol. 31, no. 7, July 1927, pp. 313–316. Boiler operation in terms of percentage of excess air; radiant heat; heat generation and absorption.

Heads. Boiler Heads in Pressure-Vessel Construction (Kesselböden im Dampffassbau), G. Hönnicke. Wärme, vol. 50, no. 18, May 6, 1927, pp. 313–319, 11 figs. Discusses geometrical and structural advantages of new convex and "diffusor" types of vertical steam drums and boilers; gives table of mean height and capacity of such heads.

Model Tests on Boiler Heads with Holes and Manholes (Modellversuche an Kesselböden mit Bohrungen und Mannlöchern), F. Körber and E. Siebel. Mitteilungen aus dem Kaiser-Wilhelm-Institut für Eisenforschung zu Düsseldorf, vol. 9, no. 2, 1927, 32 pp., 31 figs. Based on model tests, effect of fractures on deformation and stress distribution in boiler heads is investigated.

High-Pressure. Super-Pressure Boiler Installation of 110 Atmospheres (Höchst-druckkesselanlage von 110 atm.), R. Klein. Centralblatt der Hütten u. Walzwerke, vol. 31, no. 16, Apr. 20, 1927, pp. 200–202, 3 figs. Experimental Sulzer construction consisting of one low-pressure vertical-tube set of 14 atmospheres and steam temperature of 350 deg. cent.; and one high pressure set of 110 atmospheres and 375 deg. steam temperature, fired with pulverized coal; results of series of tests, lasting 8 hours each, showing feasibility and economy of construction both for new plants and for revamping of old low-pressure plants.

Vertical. An Improved Design for Vertical Steam Boilers, N. Wignall. Boiler Maker, vol. 27, no. 7, July 1927, pp. 198–199, 2 figs. Designed to overcome troubles usually encountered; provision of super-heater chamber; boiler can be machine-riveted throughout during construction.

BOILERS, WATER-TUBE

High-Power. Development of Water-Tube Boilers for High Output (Die Entwicklung des Wasserrohrkessels zum Hochleistungskessel.), F. Münzinger. Wärme, vol. 50, nos. 9 and 10, Mar. 4 and 11, 1927, pp. 158–162 and 184–190, 21 figs. Improvements of furnace, heat surfaces, and water circulation; increase of pressure; special types of boilers; improvements in shop methods and materials; arrangement of boilers, economizer, and air preheater; plant control and management; research; economic results.

BORING MACHINES

Elliptical-Hole Boring. A Cutter Head for Boring and Surfacing of Elliptical Holes in a Boring Machine (Doppelseitig schneidender Bohrkopf zum Bohren und Abflächen elliptischer Löcher auf der Bohrmaschine), F. Klautke. Werkstattstechnik, vol. 21, no. 8, Apr. 15, 1927, pp. 221–222, 5 figs. Description of combination of cutter head with roughing knife for enlarging preliminary circular perforations into elliptical holes.

C

CABLEWAYS

1400-Ft. Span. New Cableways of Asbestos Corporation, Ltd., H. V. Haight. Can. Min. Jl., vol. 48, no. 31, Aug. 5, 1927, pp. 618–621, 11 figs. Description, with principal dimensions, of cableway and equipment.

CAMS

Face, Generating. Generating Face Cams, E. A. Limming. Machy. (London), vol. 30, no. 773, Aug. 4, 1927, pp. 549–551, 4 figs. Operation involves generating process by milling cutter whose effective form and position are counterparts of those of roller.

CAR DUMPERS

Cement Works. Rolling-Type Car Dumper Handles Cars of 80 Tons' Capacity. Iron Trade Rev., vol. 81, no. 7, Aug. 18, 1927, pp. 384–385, 2 figs. Unique features of car dumper designed by Wellman-Seaver-Morgan Co., for plant of Florida Portland Cement Co., Tampa, Fla.

CAR WHEELS

Heat Treatment. Heat Treatment Eliminates Wheel Failures. Elec. Ry. Jl., vol. 70, no. 3, July 16, 1927, pp. 93–94, 4 figs. Process of hardening and tempering rolled-steel car wheels has been developed by Twin City Rapid Transit Company; wear is reduced and so far no failures have occurred.

CARS

Design. Passenger and Freight Car Design, V. Willoughby. Ry. & Locomotive Eng., vol. 40, no. 7, July 1927, pp. 197–198. Refrigeration, box, and container cars; passenger coaches too heavy.

CARS, FREIGHT

Automobile. Fifty-ton Automobile Cars for the M.-K.-T. Ry. Mech. Engr., vol. 101, no. 8, Aug. 1927, pp. 547–550, 7 figs. Designed for use in general box-car and grain traffic; equipped with 12-ft. side doors.

Dump. Automatic Two-Way Side Hinged Dump Car. Ry. Age, vol. 83, no. 7, Aug. 13, 1927, pp. 303–304, 2 figs. Design permits use in either dump or regular revenue service; capacity of 30 cu. yd.

Management and Design. Balancing Factors in the Use and Obligations Covering Ownership of Freight-Train Cars, L. K. Sillcox. Mech. Eng., vol. 49, no. 8, Aug. 1927, pp. 857–864 and (discussion) 864–870, 17 figs. Discusses development of railroad equipment to date and points out principles to be observed if railroads would continue to expand and become more efficient transportation agents; importance of standardization is emphasized.

CASE-HARDENING

Nitration Hardening. Nitration Hardening of Steel and Its Industrial Utilization (La nitruration des aciers et son utilisation industrielle), L. Guillet. Génie Civil, vol. 91, no. 2, July 9, 1927, pp. 38–43, 18 figs. Review of Fry's work and of investigations made by author; discusses industrial importance of this new remarkably simple case-hardening process.

CAST IRON

Chemical Analysis. Present and Future Status of Chemical Analysis of Cast Iron (Gegenwart und Zukunft der chemischen Analyse des Gusseisens), Wilke. Giesserei-Zeitung, vol. 24, no. 13, July 1, 1927, pp. 367–368. According to present status of chemical analysis, actual small constituents can be determined only with some percentage of errors.

Growth. Growth of Cast Iron (Ueber das Wachsen von Gusseisen), W. Schwinning and H. Flössner. Stahl u. Eisen, vol. 47, no. 26, June 30, 1927, pp. 1075–1079, 11 figs. Discusses growth of machine castings after heating at 200 to 650 deg.

Melting. The Melting Operation and Its Influence on Shrinkage, Expansion and Graphite Formation in Cast Iron (Der Schmelzbetrieb und seine Bedeutung für dei Schwindung, Audsehnung und Graphitbildung im Gusseifen), G. Krebs. Zeit. für Die Gesamte Giessereipraxis, vol. 48, no. 30, July 24, 1927, pp. 265–267. Discusses low-temperature vs. high-temperature melting, chemistry of graphite formation and general physical properties as function of melting temperature.

Nickel and Chromium in. On the Effect of Nickel and Chromium on the Strength Properties of Grey Cast Iron, E. Piwowarsky. Foundry Trade Jl., vol. 36, nos. 568 and 569, July 7 and 14, 1927, pp. 4–6 and 37–41, 8 figs. Results of author's investigations. By causing cast iron having gray to mottled charge to solidify at first white to mottled by accelerated cooling, and graphitizing it only by subsequent annealing, mechanical strengths of range hitherto unreached were obtained.

CASTING

Cast-in-Joints. The Strength of Cast-in Joints, H. W. Swift. Engineering, vol. 124, no. 3213, Aug. 12, 1927, pp. 215–216. Results of tests made at Bradford Technical College.

Continuous. Continuous Casting of Small Parts. Iron Age, vol. 120, no. 7, Aug. 18, 1927, pp. 391–393, 5 figs. Production of nearly 10,000 castings for small electrical motors attained with minimum of labor, reusing sand each hour.

Cylindrical Retort. Making a Cast-iron Retort, J. Edgar. Mech. World, vol. 82, no. 2113, July 1, 1927, pp. 3–4, 5 figs. Failing swept-loam pattern, either of two other methods may be adopted, both of which involve thicknessing; best of these methods consists in sweeping mold direct, to which thickness of loam can be applied corresponding to thickness of metal required, forming core box in which core can be readily made.

CENTRAL STATIONS

Diesel-Engined. Reducing Transmission Losses by Diesel Engine Stations, S. A. Hadley. Power, vol. 66, no. 7, Aug. 16, 1927, pp. 244–246, 2 figs. Advantages of Diesel plants for transmission lines; reduction of line losses and increase in carrying capacity; actual plants now in operation.

East River, New York. The East River Station, A. Williams. Combustion, vol. 17, no. 2, Aug. 1927, pp. 87–88. Importance of this station to the growth of New York.

Gas- and Oil-Engined. Combined Gas and Oil Engine Generating Station. Gas & Oil Power, vol. 22, no. 262, July 7, 1927, pp. 205–206, 2 figs. Account of activities of Bideford and District Electric Supply Co.; oil engine supplied by Premier Gas Engine Co. is of airless-injection type, and capable of starting from cold state instantly; Crossley-Premier horizontal engine is provided with system of copious lubrication which is visible, positive, reliable, and economical.

Heat Rates. Heat Rates for Steam Power Stations Compared, P. H. Hardie. Power, vol. 66, no. 5, Aug. 2, 1927, pp. 172–174, 5 figs. Definite conception of thermal economy to be expected from well-equipped stations with diverse equipment and designed for pressures from 200 to 1200 lb. is obtainable from curves accompanying article.

Holland. The Merwedekanaal Power Station. Engineer, vol. 144, no. 3730 and 3731, July 8 and 15, 1927, pp. 32–36 and 58–60, 6 figs. partly on p. 70. Design of station at Utrecht; very high thermal efficiency was aimed at; hence use of steam at pressure and temperature well in advance of ordinary practice was decided on; working pressure chosen for boilers was 36 atmos. or 512 lb. per sq. in., with steam temperature of 800 deg. fahr.; details of boiler house; guarantees and tests of boilers.

The Utrecht Central Power Station (Inleiding tot een bezoek aan de Centrale van de N.V. Provinciaal en Gemeentelijk Utrechtsch Stroomleveringsbedrijf, C. Noome. De Ingenieur, vol. 42, no. 29, July 16, 1927, pp. 629–641, 17 figs. Plans and detailed description of two turbo-generators of 16,000 kw., coal transportation and ash-handling plants, circulation canals for cooling water, etc.

Lauderdale, Florida. Lauderdale Steam Electric Station of the Florida Power and Light Company. South. Power Jl., vol. 45, no. 7, July 1927, pp. 36–47, 11 figs. Modern superpower plant built within Everglades under conditions most unusual and trying to furnish light and power to Great Southeastern section of Florida.

Oil Burning. Inglis Station to Supply West Florida Territory, J. E. Shoudy. Power, vol. 66, no. 6, Aug. 9, 1927, pp. 196–199, 6 figs. Description of a 25,000-kw. oil-burning plant, consisting of six 9360 sq. ft. boilers, 325 lb. pressure steam with 200 deg. superheat; two 12,500-kw. 17-stage turbo-generators bled at 2 points for 2 low-pressure heaters.

Oil-Engined. Are Spare Units Needed in Oil Engine Plants? E. J. Kates. Power, vol. 66, no. 5, Aug. 2, 1927, pp. 175–177, 4 figs. Author claims users are penalizing themselves by installing stand-by units, claims engines are as reliable as purchased energy and cites records to prove his point.

Saxton, Pa. Addition to Saxton Plant of Penn Central Light & Power Company, A. Iddles. Power, vol. 66, no. 5, Aug. 2, 1927, pp. 158–163, 10 figs. Four more boilers of same size were planned to carry 50 per cent more than first installation, to realize this 30,000-kw. unit calling for steam output of nearly additional output several interesting changes were made in original design; steam pressure and draft are automatically controlled; 17-stage 30,000-kw. turbine is bled at three points, the 10th, 13th, and 15th stages.

Sweden. Cottland Plant, Sweden, Designed for High Pressure. Power, vol. 66, no. 3, July 19, 1927, pp. 86–87, 1 fig. High-pressure unit of 5600 kw. capacity, recently installed at Slite, Sweden, is designed for maximum steam pressure of 800 lb. per sq. in.; design makes it possible to adopt high pressure when load conditions require it, without slight modification of low-pressure turbine blading.

COAL

Carbonization. The "Hood-Odell" Process, D. Brownlie Gas Engr., vol. 43, no. 615, July 1927, pp. 164–165, 3 figs. Low-temperature carbonization of North Dakota lignites.

Low-Temperature Treatment. Coal Processing, Its Future at Low Temperatures, H. C. Porter. Coal Age, vol. 32, no. 1, July 1927, pp. 39–41, 3 figs. Low-temperature treatment of coal produces smokeless fuel having many advantages not found in other solid fuels; greater yield of coke or char, more valuable oils, richer gas, satisfactory utilization of lignites and of poorer grades of coal.

Precarbonization for Power Plants. Pre-Carbonization of Power Plant Coal, R. M. Crawford. Combustion, vol. 17, no. 2, Aug. 1927, pp. 94–97. Brief review of developments in this line; reasons for choosing low-temperature carbonization.

Preparation. Trent Process Used in Rhode Island, R. Peterson. Modern Min., vol. 4, no. 6, June 1927, pp. 162–165, 4 figs. Process by which raw dirty Rhode Island coal is transformed into burnable superfuel, natural coal is first pulverized in water; entire mass is then conveyed into chamber where oil is introduced and mixture violently agitated; as mass is swirled rapidly about, drops of oil collect minute particles of coal dust and gradually separate them from grains of foreign matter; water is then drained off, carrying with it most of ash and clinkering matter.

Pulverized. See PULVERIZED COAL.

Storage and Handling. Handling and Storage Coal in Large Quantities, E. J. Tournier. Indus. Mgmt. (N. Y.), vol. 74, no. 2, Aug. 1927, pp. 89–93, 8 figs. A description of the facilities of the Consolidated Gas Company at Astoria, L. I.

COAL HANDLING

Conveyors. Coal-Handling with Ball-Bearing Belt Conveyors at a Modern Generating Station. Iron & Coal Trades Rev., vol. 115, no. 3096, July 1, 1927, p. 1, 3 figs. Way in which problem of unloading, conveying and discharging of coal has been solved by Shropshire, Worcestershire and Staffordshire Electric Power Co. at their new Stourport generating stations.

Loading Bridge. Coal-Loading Bridge with Screening Equipment (Kohlenverladebrücke mit Sieberei). V.D.I. Zeit., vol. 71, no. 26, June 25, 1927, pp. 929–930, 3 figs. Details of loading bridge constructed by Demag concern for a Danish coal company.

CONVEYORS

Aerial Ropeways. Transportation by Aerial Ropeways. So. African Min. & Eng. Jl., vol. 38, no. 1866, July 2, 1927, pp. 519–520. Advantages for "outside" mines in South Africa; special application to Barberton asbestos fields; lessons from other hilly countries.

Newspaper. Newspaper Conveyors. Indus. Mgmt. (London), vol. 14, no. 8, Aug. 1927, pp. 277–279, 3 figs. Description of corner-hung swing-tray elevator in the *Daily Mirror* plant, London.

Pneumatic. Pneumatic Coal Conveying Plant at the Sittingbourne Paper Mills. Indus. Mgmt. (London), vol. 14, no. 8, Aug. 1927, pp. 283–285, 6 figs. Pneumatic coal-handling plant erected by firm of Henry Simon, Ltd., Manchester; its special features are exceptionally great length of pipe-lines, particularly of suction pipe, also distance of vacuum pump from receiver.

COPPER ALLOYS

Age-Hardening. Copper Alloys Capable of Age-Hardening. Metallurgist (Supp. to Engineer), July 1927, pp. 109–110, 2 figs. Chemical and mechanical properties of the alloys and the heat treatment.

Manganese-Aluminum. Magnetism and Crystal Structure of Manganese-Aluminum-Copper (Magnetismus und Kristallstruktur bei Manganaluminiumkupfer), F. Heusler. Zeit. für anorganische u. allgemeine Chemie, vol. 161, no. 1–2, Mar. 14, 1927, pp. 159–160. It is suggested that in manganese-aluminum-copper at red heat aluminum atoms are completely dissociated from manganese and copper atoms, and remain so when mass is quenched; if alloy is aged at 80 deg. combination occurs between aluminum and copper atoms and between aluminum and manganese atoms, but without change in crystalline form, and metal becomes ferromagnetic.

CORES

Making. Stepping Up Production Mechanically, P. Dwyer. Foundry, vol. 55, no. 14, July 15, 1927, pp. 550–554, 9 figs. Methods and equipment employed at one of Buffalo plants of American Radiator Co.; mixing core sand; venting cores; oil-fired ovens.

COST ACCOUNTING

Machine-Hour Rate. Cost Accounting Practice with Special Reference to Machine Hour Rate, C. H. Scovell. Paper Trade Jl., vol. 85, no. 6, Aug. 11, 1927, pp. 57–62, 1 fig. What constitutes adequate cost practice; why scientific rates are important.

Methods and Problems. The Construction, Use and Abuse of Cost Accounts, A. L. Dickinson. Jl. of Accountancy, vol. 44, no. 1, July 1927, pp. 1–20. Sketch of costing methods and of some of difficulties and problems involved therein.

Standard Costs. Application of Standard Costs. Iron Age, vol. 120, no. 4, July 28, 1927, pp. 195–197, 1 fig. Practical example of use of standard burden for each department; instances of specific savings.

CRANES

A.C. and D.C. Motors For. A.C. and D.C. Motors for Crane Operation, R. F. Emerson. Indus. Engr., vol. 85, no. 7, July 1927, pp. 315–316, 2 figs. Comparing advantages of one type of motor with other, it is possible to obtain much finer speed control with d.c. series motor than with an a.c. motor.

Electric. Cranes for Use in Ports and Harbours So. African Eng., vol. 38, no. 7, July 1927, pp. 140–142, 2 figs. Comparison of working speeds in electric cranes; methods of supplying current; cables may be laid in three ways.

Gantry. Electric Traveling Gantry Crane of 480 tons of Naval Artillery Ordinance at Gavre, France (Grue roulante électrique à portique, de 480 tonnes, du polygone de l'Artillerie Navale, à Gavre, près de Lorient), C. Dantin. Génie Civil, vol. 90, no. 24, June 11, 1927, pp. 569–572, 5 figs. Crane and electric traveling platform built by Establishment Dayde for French Marine, intended for lifting heavy pieces on board warships.

Girders. The Selection of Rolled Steel Joists and Compounds for Crane Girders, E. G. Fiegehen. Mech. Wld., vol. 82, no. 2116, July 22, 1927, pp. 57–58, 4 figs. Qualifications of a satisfactory crane girder are adequate strength, adequate stiffness, lateral-rigidity, economical weight (purchase and shipping).

Speed-Limiting Brakes. Centrifugal Speed-Limiting Brake, J. P. Hall. Mech. World, vol. 82, no. 2113, July 1, 1927, pp. 9–10, 4 figs. Centrifugal overspeed brake which is claimed to be very effective in action.

CRANKCASES

Machining. Crankcase Work at the Curtiss Plant, F. H. Colvin. Am. Mach., vol. 67, no. 5, Aug. 4, 1927, pp. 187–190, 9 figs. Methods, fixtures and tools used in machining crankcase of Curtiss 400-hp., D-12 engine; studs for holding cylinder water jackets set before final boring.

CUPOLAS

Continuous Melting with. Continuous Melting with the Cupola, W. J. May. Mech. World, vol. 82, no. 2115, July 15, 1927, pp. 39–40, 2 figs. Describes cupolas suitable for general work, pointing out special feature necessary for continuous melting.

Theory and Practice. Cupolas in Theory and Practice During Past Decade (Der Kupolofen in Theorie und Praxis der letzten Jahrzehnte), W. Mathesius. Giesserei-Zeitung, vol. 24, no. 13, July 1, 1927, pp. 357–359, 4 figs. Review of cupola melting tests carried out during past ten years, from which a complete theory of process of pig-iron melting in cupola is derived.

D

DIE CASTING

Machinery and Materials. Die Casting and Its Significance in Modern Technology (Spritzguss und seine Bedeutung für die neuzeitliche Technik), A. Amigo. Sparwirtschaft, nos. 4 and 5, Apr. and May 1927, pp. 177–180 and 247–249, 11 figs. Old and new types of die-casting machines used in Germany and Austria; molds; economic aspect.

Non-Ferrous Alloys. Die Casting (Pressestøbning). Ingeniøren, vol. 36, no. 28, July 9, 1927, pp. 345–350, 7 figs. Reviews development of die casting of different alloys for various purposes; description of several casting machines.

Process. Die-Casting Process (Das Spritzgussverfahren), P. Schimpke. Stahl u. Eisen, vol. 47, no. 26, June 30, 1927, pp. 1069–1075, 7 figs. Basic principles of process; die-casting alloys; solidification process, casting molds and machines; fields of application.

DIES

Blanking, Piercing and Forming. Blanking, Piercing and Forming Dies, F. A. Stanley. West. Machy. World, vol. 18, no. 6, June 1927, pp. 261–264, 11 figs. Complete set for producing Ford oiler for filtering crankcase oil; these tools receive sheared blank and carry it through various forming, trimming and piercing operations and also blank and pierce filter plates or strainers for interior of device.

Die-Sinking Machine. Gorton No. 3-X Universal Die-Sinking and Engraving Machine. Am. Mach., vol. 67, no. 5, Aug. 4, 1927, p. 211. Suited to either heavy or light engraving and die sinking on flat or spherical surfaces.

Punch-Press. Dies for Producing Laminations, P. J. Edmonds. Machy. (London), vol. 30, no. 772, July 28, 1927, pp. 513–517, 6 figs. First of two articles dealing with design, construction, and application of dies for manufacturing laminations used in electrical apparatus.

Swaging. Construction and Operation of Swaging Dies, Frank W. Curtis. Am. Mach., vol. 67, no. 8, Aug. 25, 1927, pp. 295–298, 8 figs. Outlines conditions that characterize swaging of steel, together with detailed examples of dies for performing miscellaneous swaging operation.

DIESEL ENGINES

Airless-Injection. Solid Injection Diesel Engine for Dynamo Drive. Soc. Mech. Engrs.—Jl., vol. 30, no. 122, June 1927, pp. 295–318. In case of solid-injection system only thing to be done is to control fuel-oil quantity; author used mechanically operated fuel valve and controlled pressure positively by mechanical means; according to his design, angle of fuel valve opening as well as fuel pump is controlled automatically by governor.

Automotive Purposes. Diesel Engine Progress. Autocar, vol. 59, no. 1654, July 15, 1927, pp. 122–123, 4 figs. Wide-spread experiments, many of which promise well, are bringing oil-fuel engine nearer and nearer for automobile use. Describes new engine, known as Acro air-storage engine, operating on Diesel principles and giving satisfactory tests.

Compressorless. Compressorless, Four-Cycle Diesel Engines with Atomizer Injection (Kompressorlose Viertakt-Dieselmotoren mit Strahlzerstäubung), R. Mayer. V.D.I. Zeit, vol. 71, no. 31, July 30, 1927, pp. 1081-1088, 28 figs. Details of Linke-Hofmann engines, 200 hp. or much more in capacity, results of acceptance tests in which, using heavy viscous oils, thermal efficiencies as high as 38.3 per cent were attained.

Exhaust Turbo Charging. Exhaust Turbo Charging for Diesels. Gas & Oil Power, vol. 22, no. 262, July 7, 1927, pp. 217-218, 3 figs. New type of heavy-oil engine for medium and large outputs, which is said to offer many advantages over Diesel engines as hitherto constructed; in this new type proposed by Büchi, of Winterthur, Switzerland, air is not drawn into cylinders from atmosphere as in ordinary four-cycle Diesel engine, but is admitted in slightly compressed state from turboblower.

Mercédès-Benz. The Mercédès-Benz Diesel Engine. Motor Transport, vol. 45, no. 1167, July 25, 1927, p. 104, 1 fig. Main features of 6-cylinder power unit designed for 5-ton lorry chassis.

Motor-Truck. M.A.N. Diesel Lorry Engines, W. F. Bradley. Motor Transport, vol. 45, no. 1165, July 11, 1927, pp. 49-50, 5 figs. Main features of 4- and 6-cylinder units; economical results obtained under service conditions.

DISKS

Rotating. Structural Design of Rotating Conical Disks (Festigkeitsberechnung von rotierenden konischen Scheiben), E. Honegger. Zeit. für angewandte Mathematik u. Mechanik, vol. 7, no. 2, Apr. 1927, pp. 120-128, 8 figs. Gives rigorous analysis with tables and curves for solving formulas with little greater difficulty than with usual approximate methods; problem is of importance in steam-turbine design.

E

ECONOMIZERS

Ribbed-Tube. Experience in Construction and Operation of Ribbed-Tube Economizers (Erfahrungen im Bau und Betrieb von Rippenrohrekonomisern), P. Humann. Wärme, vol. 50, no. 21, May 27, 1927, pp. 363-369, 20 figs. Evolution of ribbed-tube economizers in Germany; design and construction, selection of fuel which will not clog pipes with residues, heat transmission, materials to be used in construction.

EDUCATION, ENGINEERING

Automotive Courses. Automotive Courses (Anregungen zur Veranstaltung automobiltechnischer Volkshochschulkursen), A. Parseval. Motorwagen, vol. 30, no. 14, May 20, 1927, pp. 312-313. Courses considered are to be carried out in Germany; many automotive engineers and executives are self-made men who have had no systematic technical training and may have in specialized advancement forgotten many things they once knew; it has been found out that lectures on old and well-known fundamental topics have proved of great interest at meetings of German automotive engineers when papers on new progress were not available; for this reason it is proposed to give regular series of such lectures; lists of subjects to be covered are calculus, differential equations, vector analysis, hydrodynamics and aerodynamics, together with advanced lectures on various phases of automobile engineering.

ELECTRIC DRIVE

Small Bench Machines. The Application of Electric Motors to Small Bench Machines. Machy. (London), vol. 30, no. 771, July 21, 1927, pp. 481-486, 12 figs. Applications to a riveting machine, a lapping machine, semi-automatic facing lathe, a boring and reaming machine, and a spinning machine.

Types. Several Types of Electric Drives Compared, R. H. Rogers. Blast Furnace & Steel Plant, vol. 15, no. 7, July 1927, pp. 344-346. Electricity is rapidly replacing other methods of generating power and thus instituting economies together with increased production; steel mills among greatest users.

ELECTRIC FURNACES

Arc. Theories of Electric-Arc Furnaces (Ueber die Theorien der elektrischen Lichtbogenöfen). Centralblatt der Hütten u. Walzwerke, vol. 31, no. 4, Jan. 26, 1927, pp. 37-38, 3 figs. Review of recent French and German investigations of energy regimen of electric furnaces as closed circuits, giving formulas and graphs.

Auxiliary Equipment. Auxiliary Equipment for Electric Melting Furnaces, J. D. Keller. Fuels & Furnaces, vol. 5, no. 8, Aug. 1927, pp. 1011-1017, 14 figs. Discussion on apparatus employed for controlling arc furnaces and induction furnaces; electrical connections; electrode regulators; power limitators; reactors; transformers; generators.

Cast Iron. Gray Cast Iron from the Point of View of the Electrical Furnace, G. K. Elliott. West. Machy. World, vol. 18, no. 6, June 1927, pp. 279-281. Outlines main features of acid and basic electric furnaces, and effects of each upon principal elements of cast iron in comparison with effects obtained through cupola.

Heat-Treatment. Electric Furnaces of Interesting Design Used in Heat Treatment of Gears, I. S. Wishoski. Fuels & Furnaces, vol. 5, no. 8, Aug. 1927, pp. 991-995, 3 figs. Electrically heated furnace of roller hearth type with heating elements above and below hearth, used in heat-treating gears and pinions for automobile differentials; automatic electric furnace with vertical heating chamber used in heat-treating ring gears.

Lining. Plastic Furnace Lining Gives Long Service. Power Plant Eng., vol. 31, no. 16, Aug. 15, 1927, pp. 870-872, 12 figs. Properly installed so that it is thoroughly pressed into uniform mass and properly vitrified it will last long periods under most severe firing.

Rotating-Arc. Theory of Rotating Electric Arc Furnace of the Evreinoff-Telny Construction (Ueber die Theorie des Elektroofens mit rotierendem Lichtbogen nach Evreinoff und Telny), K. von Kerpely. Centralblatt der Hütten u. Walzwerke, vol. 31, no. 22, June 1, 1927, pp. 293-296, 8 figs. Historical review beginning with 1893; mathematical analysis of recent designs.

ELECTRIC LOCOMOTIVES

Coupling Rods. The Design of Coupling Rods for Electric Locomotives. Engineering, vol. 124, no. 3210, July 22, 1927, pp. 95-98, 11 figs. Position of jack shaft; typical examples of arrangement of rods; automatic limitations of axial stress; reaction to tractive effort.

Great Northern Ry. Great Northern Electric Locomotives, E. R. Martin. Ry. & Locomotive Eng., vol. 40, no. 7, July 1927, pp. 191-192, 2 figs. General description of rotating apparatus and operating features.

Single-Phase. New Loetschberg Locomotive (Type 1AAA-AAA1) [La nouvelle locomotive du Loetschberg (Type 1AAA-AAA1)], G. L. Meyfarth. Revue générale des Chemins de Fer, vol. 46, no. 8, Aug. 1927, pp. 154-166, 14 figs. Detailed description of mechanical and electrical equipment of most powerful single-phase electric locomotive type known, weighing 142 metric tons, 20 m. in length, wheel diameter of 1.35 m., able to develop a speed of 75 km. per hour.

Switzerland. The New Ae4/7 Locomotives of the Swiss Federal Railways (Die neuen Ae4/7-Lokomotiven der S. B. B.), F. Steiner. Schweizerische Bauzeitung, vol. 89, no. 26, June 25, 1927, pp. 341-346, 5 figs. Standardized electric locomotive for heavy express trains in mountainous regions, 450 tons at 100 km. per hour in capacity; 4 driving axles with one 650-hp. single-phase motor each; details of electrical equipment, transformer connections, etc.

ELECTRIC RAILWAYS

Cars. De Luxe Interurban Cars Placed in Service by the Houston North Shore Railway. Elec. Ry. Jl., vol. 70, no. 6, Aug. 6, 1927, pp. 221-223, 5 figs. Texas company competes for traffic with light-weight one-man cars of attractive appearance and unusual interior appointments.

Contact System. Contact System Mounted on Springs, F. R. Thompson. Ry. Age, vol. 83, no. 7, Aug. 13, 1927, pp. 297-300, 5 figs. Electrified Lackawanna yard has overhead system installed on soft ground and designed to compensate for ice loading.

ELECTRIC WELDING, ARC

Absorption-Plant Apparatus. Importance of Welding as Applied to Absorption Plant Apparatus, J. E. Kobernick. Nat. Petroleum News, vol. 19, no. 26, June 29, 1927, pp. 23-24. Tests by General Electric and Westinghouse companies have been made covering almost every phase of arc welding and records show welding to withstand fatigue that riveted joints can never endure.

Motor-Truck Frames. Welding Offers Economical Method of Reinforcing Truck Frames. Iron Trade Rev., vol. 81, no. 4, July 28, 1927, pp. 196-197, 2 figs. Simple method of welding reinforced web to I-beams of motor-truck frames. Abstracted from W. B. Boom entry in competition for the Lincoln Electric Co., Cleveland.

Rolled Steel. Rolled Steel Fabricated by Welding Displaces Castings in Machine Construction, R. H. Rogers. General Elec. Rev., vol. 30, no. 7, July 1927, pp. 330-334, 11 figs. Rolled steel is stronger pound for pound; readily fabricated by metallic arc welding; greater freedom in machine design; quicker production; final product superior.

Structural Steel. Arc Welding a 790-Ton Steel Structure, A. M. Candy. Elec. World, vol. 90, no. 4, July 23, 1927, pp. 157-162, 8 figs. $1^1/_4$ million-cu. ft. building at Sharon, Pa., field welded at $4.90 per ton, or 45 cents per weld-foot, and erected in five weeks; factors affecting training of welders; methods used; analysis of data.

ELEVATORS

Automatic Closing Doors. Automatic Closing Elevator Doors with Interlocks. Power, vol. 66, no. 7, Aug. 16, 1927, pp. 236-237, 4 figs. Description of a mechanism for closing and interlocking elevator doors made by the Shur-Loc Elevator Safety Corporation.

Office Building. Elevator Service Requirements of the Modern Office Building, B. Jones. Gen. Elec. Rev., vol. 30, no. 8, Aug. 1927, pp. 375-386, 13 figs. Building location and types of occupancy as factors in determining elevator service; effects of business habits of building occupants; determination of traffic factors; specific data on population densities; fixing of schedule; present demands and tendencies.

ENGINEERING

Theory and Practice. Theory and Practice in Engineering, W. E. W. Millington. Indus. Mgmt. (London), vol. 14, no. 8, Aug. 1927, pp. 291-293. Abstracts from Presidential Address delivered by author at the Northwestern Section of the Junior Institution of Engineers.

ENGINEERS

Services and Salaries. Services and Salaries of Engineers, A. Richards. Professional Engr., vol. 12, nos. 1, 2, and 4, Jan., Feb., and Apr. 1927, pp. 16-23, 22-24, and 22-25, 13 figs. Data on average annual compensation for New York City employees; Massachusetts Civil Service salary classification; analysis of salaries of county engineers in Ohio; outstanding practice problems of profession; negotiations for professional engagements; unprofessional competition; legality of rules against competition. Feb.: Question as to who are professional engineers. Apr.: Salaries of civil engineers.

F

FARM MACHINERY

Factories. Workshops for Manufacturing Farm Machinery (Die Werkstätten des Landmaschinenbaues), K. Wömpner. Maschinenbau, vol. 6, no. 10, May 19, 1927, pp. 516-520, 8 figs. Principles of planning of shop groups, inter-shop transportation, continuous assembling, and individual operations.

Manufacture. Jigs and Tools in Farm-Machinery Manufacture (Vorrichtungen und Werkzeuge im Landmaschinenbau), B. Konnopasch. Maschinenbau, vol. 6, no. 10, May 19, 1927, pp. 512-516, 23 figs. Examples of correctly and incorrectly executed machine parts; principles of machine tools and jigs with practical examples.

FATIGUE

Elimination of. Reduction of Waste of Human Lives by the Elimination of Unnecessary Fatigue in Industry, E. R. Hayhurst. Soc. Indus. Engrs.—Bul., vol. 9, no. 3, Mar. 1927, pp. 22-24. Paper read at annual meeting of S.I.E. Fatigue Committee at Philadelphia Convention, June 17, 1926; adapted from author's monograph on "Occupation and Diseases of Middle Life" in "Diseases of Middle Life," edited by F. A. Craig, vol. 1, pp. 83-174, F. A. Davis Co., 1923.

FLOW OF FLUIDS

Jets Deflected by Wall Surfaces. Plane Jets Deflected by Wall Surfaces. Soc. of Mech. Engrs.—Jl., vol. 30, no. 122, June 1927, pp. 257-294, 45 figs. Results of analytical and experimental investigations of jets of two dimensions deflected by various wall surfaces; deals also with jet guided and deflected by two very long straight walls making corner angle; author calculates angle of deviation, increase of breadth of jets at center of deflection and pressure distribution along wall, which are important in design of turbine vanes; it is also made clear that if initial direction of jet is set tangentially to wall end, some part of flow will leak outwardly from wall tip. (In Japanese.)

FLOW OF WATER

Turbulent, Velocity Distribution. Velocity-Distribution Curve in Turbulent Flow (Die Quer-Geschwindigkeitskurve bei turbulenter Strömung), H. Krey. Zeit. für angewandte Mathematik u. Mechanik, vol. 7, no. 2, Apr. 1927, pp. 107-113, 7 figs. Reviews recent investigations of vertical velocity curves in pipes and open channels and derives theoretical formulas which are checked by recent precise gagings of flow in pipes and open channels; note on velocity distribution along horizontal axis.

FLUIDS

Two-Dimensional Layers. Superficial Solutions of Two-Dimensional Fluid Layers (Les solutions superficielles ou les fluides à deux dimensions), A. Troller. Nature (Paris), no. 2761, May 15, 1927, pp. 443-448, 12 figs. Deals with peculiar method of spreading of certain materials, such as oleic acid, benzoate of benzyl, camphor, etc., over surface of water; facts brought out may possibly have bearing on certain phenomena occurring in boilers; such materials have ability of spreading upon surface of water in a layer which has ability to spread indefinitely in two dimensions. See translation in Mech. Eng., vol. 49, no. 9, Sept. 1927, p. 1019.

FLYING BOATS

Dornier. The All Metal Dornier Superwal. Aviation, vol. 23, no. 3, July 18, 1927, pp. 142-144, 5 figs. Claimed to be world's largest flying boat and powered with two-Rolls Royce 650-hp. engines.

Singapore All-Metal Flying Boat. The "Singapore" All-Metal Flying Boat. Engineer, vol. 144, no. 3733, July 29, 1927, p. 131, 2 figs. Singapore is first all-metal flying boat built by British constructors to be acquired by Royal Air Force; designed to take either two Condor engines or three Jupiter or three Napier Lion engines.

FORGE SHOPS

Automobile Plants. Dodge Forge and Heat Treating Plant, C. Longenecker. Forging—Stamping—Heat Treating, vol. 13, nos. 5, 6, and 7, May, June, and July 1927, pp. 174-177, 212-215, and 260-264, 12 figs. New plant of Dodge Brothers; routing of material; fuel supply and distribution. Exemplifies latest practice in design and equipment; efficient lighting and ventilation; furnaces and hammers located to facilitate movement of material. Heat treating, cleaning, and pickling performed on large-scale production; "safety first" given adequate attention.

Willys-Overland Plant, J. N. Willys. Mfg. Industries, vol. 14, no. 2, Aug. 1927, pp. 91-94, 5 figs. Description of new shop and economies effected.

Non-Financial Incentives in. The Value of Non-Financial Incentives in the Forge Shop, J. Thompson. Forging—Stamping—Heat Treating, vol. 13, no. 6, June 1927, pp. 228-230. Discussion of inducements, other than wages, which affect a workman's attitude toward his work and result in increased interest and efficiency.

FORGING

Flow of Metals in. The Flow of Metals in Forging. Forging—Stamping—Heat Treating, vol. 13, no. 7, July 1927, pp. 248–252, 2 figs. To secure maximum strength and durability parts should be so formed that "flow lines" are in correct position; methods of etching.

Upset Process. Forging by the Upset Process, J. C. Kielman. Forging—Stamping—Heat Treating, vol. 13, no. 6, June 1927, pp. 208–211. Forging rings by upset process; use of right steel for forging dies and proper heat treatment essential for long service.

FOUNDRIES

Compressed Air in. Compressed Air Aids Foundry to Turn Out More and Finer Castings, R. G. Skerrett. Compressed Air Mag., vol. 32, no. 8, Aug. 1927, pp. 2101–2106, 18 figs. Article reveals how air-driven tools or equipment render it feasible to take inexperienced hands and make them capable and skillful in the foundry within relatively brief span.

Steel, Phraseology. Steel Foundry Phraseology. Research Group News, vol. 4, no. 2, July 15, 1927, pp. 137–140. Presents and defines terms with which users of steel castings may become acquainted to their advantage, in desired better familiarity with shop practices, encouraged by progressive steel founders; terms relating to equipment, molding, metal and defects.

FOUNDRY EQUIPMENT

Mold Conveyors. Mould Conveyors. Foundry Trade Jl., vol. 36, no. 568, July 7, 1927, p. 3, 1 fig. Apparatus designed to overcome breakage of molds and their cores during passage along gravity conveyors; this is accomplished by providing evenly spaced movable triggers, which are carried on mechanically actuated supports; when these are upstanding, molds are arrested and prevented from running into each other.

FUELS

Coal. See COAL.
Oil Fuel. See OIL FUEL.
Pulverized Coal. See PULVERIZED COAL.

FURNACES, INDUSTRIAL

Charging Machines. Charging Machines for Industrial Furnaces. Engineering, vol. 124, no. 3211, July 29, 1927, pp. 136–137, 10 figs., partly on supp. plate. Machine employed in handling steel plates in heat-treating furnaces.

Design. Practical Industrial Furnace Design, M. H. Mawhinney. Forging—Stamping—Heat Treating, vol. 13, no. 7, July 1927, pp. 271–275, 1 fig. Enumeration of several channels through which heat is lost; calculations for electric furnaces; rate of heating and methods for saving heat.

G

GAGES

Temperature of Adjustment. Temperature of Adjustment of Industrial Gages (La température d'ajustage des calibres industriels), A. Pérard. Génie Civil, vol. 90, no. 26, June 25, 1927, pp. 621–624, 3 figs. Plea to German Industrial Standards Committee to re-adopt adjustment of 0 deg. instead of 20 deg. cent.; discusses requisite precision for industrial gages and necessity for standardization of temperature of adjustment.

GAS PRODUCERS

Parker. The Parker Gas Producer. Motor Transport, vol. 45, no. 1164, July 4, 1927, pp. 19–20, 3 figs. Particulars of plant in its latest improved form intended for overseas service using charcoal fuel.

GAS TURBINES

Prospects for. The Internal Combustion Turbine, E. C. Wadlow. Engineer, vol. 144, no. 3736, Aug. 19, 1927, pp. 197–198. As stated by author, gas turbine "combines, in fact, most of drawbacks of each" (steam turbine and explosion piston engine) "without having their separate advantages;" in these circumstances, possible fields of operation must inevitably be few, and dependent upon certain favorable conditions obtaining; result is that internal-combustion turbine is unlikely to make rapid progress, even when technical difficulties have been overcome.

GEAR CUTTING

Planers. "Sunderland" Double Helical Gear Planers. Brit. Machine Tool Eng., vol. 4, no. 45, May–June 1927, pp. 593–595, 4 figs. Machine has been constructed to cut either spur, spiral, or double-helical gears.

GEARS

Instrument for Measuring Normal Pitch. Instrument for Measuring Normal Pitch, B. Wheeler. Automotive Industries, vol. 57, no. 6, Aug. 6, 1927, pp. 186–190, 17 figs. Instruments designed to gage distance between corresponding involute contours on consecutive teeth measured along line perpendicular or normal contours.

Molded. Constant Improvement in Molded Gears. Plastics, vol. 5, no. 7, July 1927, pp. 325–326 and 344, 5 figs. Patented processes disclose short cuts in manufacturing methods that should further extend usefulness of silent fibrous gears; recent patent to J. M. Taylor, principal object of which is to provide noiseless gear having novel distribution of sound-reducing and other materials; artificial resin used; Jaspert's invention is directed to method of forming composite gear wheels; material employed is in form of continuous strip of fibrous material impregnated with binding agent, such as well-known phenolic-condensation product.

Tooth Machining and Measurement. Machining and Measuring Gear Teeth, E. Buckingham. Am. Mach., vol. 67, no. 8, Aug. 25, 1927, pp. 313–317, 4 figs. Calculation of setting angles of tools for cutting involute helicoidal relief surfaces on hobs with radial flutes; modification with helical flutes; distortion of profile with undercut flutes.

GRAPHITE

Lubrication Tests. Graphite Lubrication in Practice (Graphitschmierung in der Praxis), L. Jarma. Zeit. des Oesterr. Ingenieur- u. Architekten- Vereines, vol. 79, no. 25–26, June 24, 1927, pp. 244–246, 1 fig. Results of tests on lubricating motor bearings with graphite compound known as "Kollag," showing economy in power and oil consumption of nearly 50 per cent.

GRINDING

Centerless. Centreless Grinding Practice. Automobile Engr., vol. 36, no. 230, July 1927, pp. 264–266, 8 figs. Typical examples of work in American factories.

Finishing by. Finishing by Grinding from a Foreign Viewpoint, J. Reindl. Abrasive Industry, vol. 8, no. 8, Aug. 1927, p. 259. Stresses importance of commercial grinding and draws attention to fact that it is in production of fine quality of surfaces that grinding process is of especial importance.

Physics and Technology of. Principles of Grinding (Di eGrundlagen des Schleifens), C. Krug. V.D.I. Zeit., vol. 71, no. 32, Aug. 6, 1927, pp. 1109–1116, 36 figs. Classification of types of grinding, from rough to finest; physics and technology of grinding process studies with aid of microscope; structure and design of grinding wheel; analytic and experimental study of details of grinding; list of technical problems requiring study.

Slides and Ways. Grinding Ways and Slides, L. Sichel. Machy. (London), vol. 30, no. 771, July 21, 1927, pp. 498–500, 5 figs. Machines used; method of setting up work; quality work.

GRINDING MACHINES

Camber Grinding. Roll-Grinding Machine with Cambering Attachment. Machy. (London), vol. 30, no. 772, July 28, 1927, pp. 518–519, 3 figs. Description of horizontal machine by Churchill Machine Tool Co., Ltd., Broadheath.

Face. Face Grinder Supersedes Planer. Abrasive Industry, vol. 8, no. 8, Aug. 1927, pp. 251–252. Based on comparative study of results obtained from heavy-duty 36-inch face grinding machine and 36-inch planer made at plant of Link Belt Co., Chicago; cost reduction on five typical operations averaged 66 per cent when using grinding machine.

Regrinding Axle Journals. A New Development: Double-ended Axle Journal Regrinding Machines. Brit. Machine Tool Eng., vol. 4, no. 45, May-June 1927, pp. 588–592, 3 figs. New form of drive has now been evolved by Churchill Machine Tool Co., possessing none of disadvantages of types in use previously; it enables double-ended machines to be used with success, and full advantage to be taken of possibility of grinding both axle journals of wheel sets simultaneously.

Surface. Direct Motor-Driven Vertical Surface Grinding Machines. Machy. (London), vol. 30, no. 771, July 21, 1927, pp. 486–487, 4 figs. Description of a machine with T-slot table 4 ft. 6 in. by 18 in. and 3 rates of automatic traverse.

36-inch by 12-inch Surface Grinding Machine. Machy. (London), vol. 30, no. 773, Aug. 4, 1927, p. 558, 2 figs. Description of 36 by 12-in. surface grinding machine made by John Holroyd & Co., Ltd., Milnrow, Rochdale.

H

HAMMERS

Electropneumatic. Metal Working with an Electropneumatic Hammer (Metallbearbeitung mit einem elektropneumatischen Hammer), H. Fein. Maschinenbau, vol. 6, no. 8, Apr. 21, 1927, pp. 394–397, 12 figs. Discusses its use for chiseling, riveting, removal of rivet, and bolt heads, etc., and time economy effected in comparison with manual methods.

Forging. Coöperation Between Hammer Builders and Users, Macdonald S. Reed. Forging—Stamping—Heat Treating, vol. 13, no. 6, June 1927, pp. 216–221, and 224. States that problem of eliminating certain hammer sizes and of standardizing die notches demands coöperation for its solution; hammer foundations; standards of performance; size limit for steam and board hammers.

Steam Drop Hammer. Chambersburg Steam Drop-Hammer. Machy. (N. Y.), vol. 33, no. 12, Aug. 1927, p. 952, 1 fig. Drop hammer weighing 536 lb. has recently been built by Chambersburg Engineering Co., Chambersburg, Pa., for Crane Co., of Chicago, Ill.; it will be used for drop-forging valve bodies designed for high-pressure steam duty; it is believed by builder to be largest steam drop hammer ever constructed.

HANGARS

Portable. Portable Hangars. Instn. Aeronautical Engrs.—Jl., vol. 1, no. 7, July 1927, pp. 35–50 and (discussion) 50–55. Describes hangars designed to satisfy air ministry's requirements for mobilization hangars; design, materials, construction, protection against corrosions and damage.

HARDNESS

Theory of. Theory of Hardness (Beitrag zum Härteproblem), G. Sachs. Zeit. für Technische Physik, no. 4, 1927, pp. 132–141, 22 figs. Report on experiments with iron and copper, made at Kaiser Wilhelm Inst. of Berlin, to verify Prandtl theory; results are in accord with theory of elasticity.

HEAT TRANSMISSION

Skin Friction and. New Experiments on Heat Loss and Skin Friction in Cylindrical Conduits (Nuovi Esperimenti Sulla Relazione Tra Perdita Di Calore ed Attrito Superficiale Nei Condotti Cilindrici), E. D. Nunzio. L'Elettrotecnica, vol. 14, no. 11, Apr. 15, 1927, pp. 234–239, 6 figs. Reviews theoretical and experimental work of Reynolds, Stanton, Taylor, Prandtl, etc.; also recent experiments of British Aeronautical Research Committee, on flow of fluids, and reports series of original experiments, at the Royal Inst. of Applied Physics and Electrical Eng. of Padua, using water as flowing medium, which check Taylor's theoretical formulas.

HEATING

Calculations. "Responsivity" as a Factor in Heating Calculations, C. F. Wolfsfeld. Heating & Ventilating Mag., vol. 24, no. 8, Aug. 1927, pp. 55–61, 3 figs. New method of figuring based on rate of heat penetration through building materials.

HEATING, ELECTRIC

Boilers. The Cogenga Electric Boiler (La chaudiere electrique Cogenga), M. Gacogne. Revue Générale de L'Electricité, vol. 22, no. 3, July 1927, pp. 115–120, 8 figs. Description of prize-winning French invention, consisting of electrodes immersed in small chamber filled with water, which is set in volume of water to be heated; vapor forming in small chamber acts as insulator and maintains pressure equilibrium; principle of this self-regulating device can be put to other uses, such as circuit breaking, thermostat for temperatures above 100 deg. cent., etc.

HEATING, STEAM

Central. Purdue's New Central Heating Plant, J. D. Hoffman. Heat. & Vent. Mag., vol. 24, nos. 7 and 8, July and Aug., 1927, pp. 69–71 and 79 and 64–68, 9 figs. Details of steam-heating and power-distributing system covering 1000 acres with radiation load of 700,000 sq. ft. Determining steam requirements and sizes of mains; costs of materials, equipment, and installation.

Germany. Central Heating Plants (Fernheizwerke), G. P. Schubach. Centralblatt der Hütten u. Walzwerke, vol. 31, no. 4, Jan. 26, 1927, pp. 39–42, 9 figs. Recent German steam and hot-water installations for heating of residential or industrial groups of buildings.

HYDRAULIC ACCUMULATORS

Germany. Claims World's Largest Hydraulic Accumulator Works. Elec. World, vol. 90, no. 3, July 16, 1927, p. 111. Construction of large hydraulic accumulator works was recently commenced at Niederwarths, near Dresden, Germany; River Elbe is to be raised 500 ft. to accumulator tank by generator operated as motor under cheap night energy in order to be available for conversion to peak-load current at any time during day.

HYDRAULIC GEARS

Schwartzkopff-Huwiler. Tests on Schwartzkopff-Huwiler Hydraulic Gear (Versuche an einem Flüssigkeitsgetriebe Bauart Schwartzkopff-Huwiler), W. Pauer. V.D.I. Zeit., vol. 71, no. 26, June 25, 1927, pp. 919–924, 14 figs. Results of tests on a 50-hp. gear, giving efficiency and distribution of losses.

HYDROELECTRIC DEVELOPMENTS

Austria. The Danube as a Source of Power (Die Donau als Energiequelle), V. Kaplan. Zeit. des Oesterr. Ingenieur- u. Architekten-Vereines, vol. 79, no. 3–4, Jan. 21, 1927, pp. 21–26, 8 figs. Reviews plans for developing from 160,000 to 300,000 hp., and answers objections that development would not be economical by pointing to high efficiency of Kaplan turbines, as illustrated by Lilla Edet (Sweden) power installation of 14,000-hp. capacity with efficiency as high as 93 per cent.

California. Big Creek-San Joaquin Hydro-Electric Project of the Southern California Edison Company. West. Constr. News, vol. 2, no. 13, July 10, 1927, pp. 28–36, 9 figs. Major hydroelectric development of Southern California Edison Co.'s system is known as Big Creek project, where plants are now in operation with total installed capacity of 345,700 hp.; present development is only part of comprehensive scheme for development of hydroelectric resources of practically entire drainage area of south fork of San Joaquin River and Big Creek, and their tributaries, embracing area of 500 sq. mi. and utilizing practically entire fall of these streams between elevation 7000 and elevation 1000 ft.; present plans contemplate ultimate construction of 7 power houses with installed capacity in excess of 870,000 hp. and 6 storage reservoirs with combined storage capacity of 445,000 acre-feet.

Gatineau, Quebec. Bird's-Eye View of the Farmers Rapids and Chelsea Power Plants. Engineer, vol. 144, no. 3736, Aug. 19, 1927, p. 195. Cost of undertaking will approximate to $50,000,000, between 700,000 and 800,000 hp. will be developed when three plants now under construction are completed, and 200,000 hp. will be transmitted to Toronto, Ontario, distance of 200 miles; included in development scheme is large newsprint mill, designed to turn out 700 tons of newsprint a day.

Spain. The Aluminum Industry in the Aragonian

Pyrenees (La industria del aluminio en los Pirineos aragoneses), J. P. Luesma. Ingenieria Y Construccion, vol. 5, no. 54, June 1927, pp. 269–278, 21 figs. Description of high-head hydroelectric developments and electric plants; general layout and brief description of electrometallurgical (Soderberg system) plant producing about 1200 tons of aluminum per annum.

HYDROELECTRIC PLANTS

Construction. Construction Methods for Power Plants. Contract Rec. & Eng. Rev., vol. 41, no. 29, July 20, 1927, pp. 719–721. Extensive nature of hydroelectric developments and usual necessity for rapidity of work require special equipment layout; how Hemmings Falls development was carried out.

Italy. Hydroelectric Plants on Lake Matese (Italy) [Les aménagements hydroélectriques du Lac Matese (Italie meridionale)], T. Pausert. Revue Générale de l'Electricité, vol. 21, no. 18, Apr. 30, 1927, pp. 693–704, 9 figs. Total of 22,600 kva. has been added to power supply of Naples and its environs with opening of twin stations described; water from Lake Matese is carried through tunnel to surge tower, from which steep penstock supplies 1500-ft. head to two 540-r.p.m., 5400-kw.; Pelton turbines directly connected to 7000-kva., 3-phase generators; their output is carried 4 miles in underground cables to second station; three 12,000-kva. 3-phase transformers step total amount of energy up to 68,000 volts for four long-distance transmission lines to Benevento and Naples.

Jordan River, Canada. Jordan River Hydro Power Development. Can. Engr., vol. 53, no. 5, Aug. 2, 1927, pp. 179–181, 6 figs. Supplies power to Victoria and municipalities on Vancouver Island; Ambursen dam is 891 ft. long and 126 ft. maximum height; two Pelton-double wheels have capacity of 600 hp. each and third unit of 13,000 hp.; new flume construction.

Nova Scotia. Sandy Lake Hydro Power Development, H. S. Johnston. Can. Engr., vol. 53, no. 2, July 12, 1927, pp. 119–120, 3 figs. Nova Scotia power commission has commenced work on new development as part of St. Margaret's Bay system; Mill Lake power station will be extended to take two 2500-hp. units; intake dam and wood-stave pipe line.

Ontario. New Hydro Plant in Almonte, W. H. Black. Elec. News, vol. 36, no. 14, July 15, 1927, pp. 29–30, 2 figs. New development is located at foot of second of cascades into which Mississippi River breaks in its flow through town; power house is connected by 100-ft. cement-lined canal with natural mill pond situated between first and second cascades.

Parallel Operation with Steam. Operation of Hydro and Steam Plants in Parallel, F. A. Allner. Power, vol. 66, no. 4, July 26, 1927, pp. 135–138, 4 figs. Steam plant having two 10,000-kw. units is located at hydro station and is designed for operating conditions at hydro plant; hydro units, which are rated at 13,500 to 20,000 hp., are commonly brought up to speed from standstill and synchronized with system in less than a minute without any preliminary preparations, and frequently time is less than one-half minute.

Quebec. Coaticook Hydro-Electric Power Plant, A. A. Young. Can. Engr., vol. 52, no. 26, June 28, 1927, pp. 624–627, 8 figs. Water is conveyed from pond through tunnel 1550 ft. long to power plant where two 1000-hp. turbines and generators are installed; tunnel was driven through rock and is lined with concrete; horseshoe section 7 ft. wide by 8 ft. high.

Spain. The Villalba Hydro-Electric Station; Spain. Engineering, vol. 124, no. 3210, July 22, 1927, pp. 101–102, and 103, 6 figs. partly on p. 100. Head of water utilized is one available on River Jucar; water from Uña Lake has also been rendered available, lake being used as compensating reservoir; main reservoir of La Toba has capacity of 35,000,000 cu. m.; generating station contains two Francis turbines coupled to 6500-kva., 6000-volt alternator.

I

ICE MANUFACTURE

Cracking. Forcing Production in Ice Plants, C. H. Berter. Power Plant Eng., vol. 31, no. 16, Aug. 15, 1927, pp. 891–892, 1 fig. Cracked ice led to investigation of various factors involved in forcing refrigerating equipment to secure high capacity; unbalanced plant justified.

ICE PLANTS

Diesel-Engined. Experiences with Diesel Engines in a California Ice Plant. Power, vol. 66, no. 7, Aug. 16, 1927, pp. 248–249, 3 figs. Oil engines give a low cost per ton of ice; high atmospheric temperature prompted cooling of engine air; noise of exhaust silenced.

INDICATORS

High-Speed Internal-Combustion Engines. An Electrical Indicator For High-Speed Internal-Combustion Engines, J. Obata. Engineering, vol. 124, no. 3215, Aug. 26, 1927, pp. 253–254, 9 figs. Electrical indicator described in article was developed for purpose of serving for general use in laboratory where research work relating to high-speed internal-combustion engines is carried out; indicator requires an electrical recording instrument, such as a string galvanometer, a string electrometer or, preferably, a Duddell oscillograph, so that author does not claim that it is suitable for use in an ordinary works testing department.

Internal-Combustion Engines. Indicator for High-Speed Internal Combustion Engines (Sur un manographe pour la mesure des pressions rapidement variables et un indicateur pour l'étude des machines thermiques à grande vitesse), M. Huguenard, A. Magnan, and A. Planiol. Académie des Sciences—Comptes Rendus, vol. 184, no. 11, Mar. 14, 1927, pp. 667–671, 1 fig. Describes in general terms manometer containing Bourdon tube fixed at its center, two ends actuating mirror through flexible strips; by suitable reduction of dimensions and choice of materials it has been found possible to reduce natural period of vibration to order of one-third of one-thousandth of second, while expansion under maximum pressure is less than 1 cu. mm. See translated abstract in Science Abstracts (Sec. B), vol. 30, part 6, June 25, 1927, p. 291.

INDUSTRIAL MANAGEMENT

Budgetary Control. Principles of Budgetary Control, A. W. Torbet, Soc. of Indus. Engrs.—Bul., vol. 9, no. 2, Feb. 1927, pp. 7–10. Before The Society of Industrial Engineers, Chicago Chapter, Jan. 11, 1927.

Problems in Applied Budgeting, G. M. Pelton. Soc. of Indus. Engrs.—Bul., vol. 9, no. 2, Feb. 1927, pp. 11–16. An address delivered at meeting of S.I.E., Chicago Chapter, Feb. 10, 1927.

Cost Accounting. See COST ACCOUNTING.

Economics. The Economist as an Industrial Engineer, L. S. Lyon. Soc. Indus. Engrs.—Bul., vol. 9, no. 3, Mar. 1927, pp. 10–12 and 21. Similarity of work of economist and industrial engineer. Address delivered at S.I.E. 13th National Convention, Philadelphia, June 18, 1926.

Fatigue. See FATIGUE.

Inventories. Tested Methods for an Accurate Inventory, T. H. Hicks. Mfg. Industries, vol. 14, no. 2, Aug. 1927, pp. 107–110, 7 figs. As applied in the United States Navy.

Machine-Tool Replacement. Shop-Equipment Policies in Representative Plants, L. C. Morrow. Mech. Eng., vol. 49, no. 9, Sept. 1927, pp. 970–974. Reasons for discarding equipment; time during which new equipment must pay for itself; methods of buying and discarding; faults of machine tools; methods of drive; records.

The Economics of Machine-Tool Replacement, M. C. Curtis. Mech. Eng., vol. 49, no. 9, Sept. 1927, pp. 966–970, 9 figs. Present market conditions and tendencies in machine-tool design; comparison of new with former types of machine tools and savings effected by replacements.

Measurement of Effect of Fatigue. An 18% Reduction in Unit Labor Cost, W. C. Hasselhorn. Mfg. Industries, vol. 14, no. 2, Aug. 1927, pp. 133–135, 6 figs. Through measurement of effect of fatigue and improvement in working conditions.

Office Work. The Principles of Effective Management Applied to Office Work, F. L. Rowland. Soc. Indus. Engrs.—Bul., vol. 9, no. 7, July 1927, pp. 11–20. Problems in personnel, mechanical equipment, and methods. Address delivered at S.I.E. 14th National Convention, Chicago, May 27, 1927.

Planning Work. Economic Planning in Drafting Room (Wirtschaftliches Arbeiten im Konstruktionsbüro), H. H. Schmidt. Maschinenbau, vol. 6, no. 8, Apr. 21, 1927, pp. 380–387, 12 figs. Outline of German methods for systematizing and increasing efficiency of designing and computation routine in planning department.

Pooling of Ideas. How Pooling Ideas Can Reduce Costs, F. C. Shafer. Mfg. Industries, vol. 14, no. 2, Aug. 1927, pp. 125–128, 6 figs. Group meetings of standards, engineering, purchasing, and manufacturing departments are recommended by Mr. Shafer as means to lower costs; on one part where this method was tried cost was reduced 27 per cent; on another cost was cut from $4.25 to $2.25.

Production. Teaching Production Principles to Engineering Students, M. A. Lee. Soc. of Automotive Engrs.—Jl., vol. 21, no. 2, Aug. 1927, pp. 193–199, 4 figs. Outline of curriculum at Cornell University.

Production Control. Production Control for Lower Costs, F. B. Calhoun. Mfg. Industries, vol. 14, no. 2, Aug. 1927, pp. 95–98, 4 figs. Goodyear production service division, from market analysis to delivery of products to shipping department, provides every facility for rapid manufacturing at lowest cost; control is function separate from actual production and has produced big savings in all operations.

Rationalization. Psychotechnical Rationalization of Working Processes (Psychotechnische Rationalisierung der Arbeitsprozesse), B. Herwig. Elektro-Jl., vol. 7, no. 10, May 25, 1927, pp. 160–165, 6 figs. Discusses fatigue, time, motion, and efficiency studies; German experiments on working conditions and form and arrangement of tools vs. efficiency.

Research in. Research in Management, L. P. Alford. Soc. Indus. Engrs.—Bul., vol. 9, no. 7, July 1927, pp. 27–31. One of most necessary lines of management research should be to discover, formulate, declare, and show how to apply basic laws of management.

Time Study. See TIME STUDY.

Trend. The Trend of Science in Management, D. S. Kimball. Soc. Indus. Engrs.—Bul., vol. 9, no. 7, July 1927, pp. 21–26. Address delivered at opening session of S.I.E. 14th National Convention, Chicago, May 25, 1927.

INDUSTRIAL PLANTS

Layout. Comparative Economy of Flow Order and Machine-Type Order of Plant Layout (Vergleichende Untersuchung der Wirtschaftlichkeit einer Fertigung bei Anordnung der Werkstätten in Erzeugnis- bezw. Werkzeugmaschinenordnung), M. Wrba. Werkstattstechnik, vol. 21, no. 11, June 1, 1927, pp. 313–317, 2 figs. Theoretical study of fictitious machine-tool plant illustrating comparative efficiency and economy of planning factory on basis of operation departments, such as turning, milling, planing, etc., or on basis of processes in which various machines are grouped together as required by process of manufacture; latter found more advantageous.

Location. Waterfront Industrial Sites Have Great Possibilities in Reducing Costs, H. S. Colburn. Mfg. Industries, vol. 14, no. 2, Aug. 1927, pp. 117–120, 6 figs. Factors to consider in choosing a site.

Obsolescence and Depreciation. Obsolescence and Depreciation, G. James. Taylor Soc.—Bul., vol. 12, no. 3, June 1927, pp. 442–446. Studied from management's point of view.

Safety. What Can the Small Plant Do About Safety? W. D. Keefer. Factory, vol. 39, no. 1, July 1927, pp. 56–57. Essentials of safety work are same in small plant as they are in large plant; general safety committee is an essential of effective safety work; use of safety posters, either home-made or those obtainable from Nat. Safety Council is urged.

INDUSTRIAL PSYCHOLOGY

Personnel, Treatment of. Industrial Psychology of Personnel Treatment (Psychotechnik der Menschenbehandlung), F. Giese. Maschinenbau, vol. 6, no. 8, Apr. 21, 1927, pp. 375–380. General discussion of problem and methods of investigating it.

INDUSTRIAL RELATIONS

Conciliation. Conciliation in Labor Disputes, H. L. Kerwin. Min. Congress Jl., vol. 13, no. 7, July 1927, pp. 502–504. Coöperation between employers and employees; industrial-relations adjustments over 14-year period; violence giving way to peaceful settlements; prosperity created by new viewpoint of employer and employee.

INSULATION, HEAT

Measuring Apparatus. Recent Developments in Measurement of Heat Insulation in Austria (Zur neueren Entwicklung des wärmeschutztechnischen Messwesens in Oesterreich), G. Hofbauer. Sparwirtschaft, no. 2, Feb. 1927, pp. 63–66, 7 figs. Descriptions including electric wiring diagrams, of plate and pipe insulators, developed in Austria and Germany.

Moisture, Protection Against. Protection of Insulation Against Moisture, C. H. Herter. Refrigeration, vol. 42, no. 1, July 1927, pp. 60–62. Compares old and new methods of protection; describes approved method of erecting corkboard insulation.

INTERNAL-COMBUSTION ENGINES

Volumetric Compression. Limit of Volumetric Compression in Internal-Combustion Engines (Au sujet de la limit de compression volumétrique dans les moteurs à explosion), M. P. Dumanois. Société d'Encouragement pour l'Industrie Nationale—Bul., vol. 126, no. 1, Jan. 1927, pp. 36–42, 4 figs. Discusses transition from combustion to detonation in gases and reviews recent researches of Lafitte and of Lafitte and Dumanois; distance traversed by combustion phase diminishes with rising initial pressure.

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; OIL ENGINES.]

IRON AND STEEL

Properties at High Temperatures. Armco Iron and Mild Steel at High Temperatures. Engineering, vol. 124, no. 3212, Aug. 5, 1927, pp. 181–182, 12 figs. From Special Report No. 1, Dept. of Scientific and Industrial Research, Engineering Research, covering armco iron and 0.17 and 0.24 carbon steel.

L

LABOR

Five-Day Week. The Five-Day Week, A. H. Young. Soc. Indus. Engrs.—Bul., vol. 9, no. 7, July 1927, pp. 3–10. An address delivered at S.I.E. 14th National Convention, Chicago, May 26, 1927.

LATHES

Automatic. Monforts Automatic Chucking Lathe. Machy. (London), vol. 30, no. 772, July 28, 1927, pp. 526–530, 8 figs. A new auto-lathe with many interesting features.

Crankshaft. Melling Crankshaft Cheek-Facing and Pin-Turning Lathe. Am. Mach., vol. 67, no. 5, Aug. 4, 1927, pp. 205–206, 2 figs. So designed that it faces simultaneously cheeks adjacent to crankpins and rough-turn crankpins of crankshaft in one operation.

Semi-Automatic. A New Model Production Lathe. Automobile Engr., vol. 36, no. 230, July 1927, p. 267, 2 figs. Improvement in Maxicut multiple-tool semi-automatic machine.

Turret. The Turret Lathe on Small Quantities. Brit. Machine Tool Eng., vol. 4, no. 45, May-June 1927, pp. 602–607, 12 figs. Argument against installation of heavy turret is nearly always on account of small quantities, but providing there is range of suitable pieces to be produced smallness of quantity of each piece is of secondary importance.

Vertical Turret. Large Vertical Single-Column Turret Lathes (Grosses Einständriges Karussell-Drehwerk), S. Weil. Werkstattstechnik, vol. 21, no. 13, July 1927, pp. 395–398, 7 figs. Detailed description and drawings of a 79-ton machine designed for work of 7 m. x 1.8 m.; specimens which may weigh 35 to 40 tons.

Wheel. Double Wheel Lathe. Machy. (London), vol. 30, no. 771, July 21, 1927, pp. 506–508, 5 figs. Multi-tool machine for railway wheel centers.

Work Charts for. Work Charts for Lathes (Die Grundlagen und der Aufbau einer einwandfreien

Drehbankarbeitstafel und Bankbestimmungstafel), K. Wiegert. Werkstattstechnik, vol. 21, no. 7, Apr. 1, 1927, pp. 188–191, 5 figs. Critical review of German theories and formulas for lathe turning, showing erroneous results and lack of agreement; proposes chart based directly on original experiments, from which criticized formulas had been derived; proposed chart involves cutting speed, cross-section of cutting, volume of cutting, volume of cutting per min. and hp.; from chart author derives work cards for various materials, turning operations and lathe sizes.

LIGHTING

Daylighting. Cost of Daylight Illumination in Industrial Plants, M. Luckiesh. Indus. Engr., vol. 85, no. 7, July 1927, pp. 307–309, 2 figs. From viewpoint of uniform distribution of light over floor or other horizontal planes, overhead syklights are generally superior to windows in walls; however, use of skylights limits buildings to one-story construction, or involves use of light courts.

Daylight in Workshops (Beurteilung der Tagesbeleuchtung in Werkstätten), E. Möhler. Werkstattstechnik, vol. 21, no. 11, June 1, 1927, pp. 319–325, 5 figs. Hygienic and psychological effect of daylight on workers overlooked by builders of plants; discusses daylight quotient, inadequate daylight intensity, light requirements of various kinds of work, original studies of sidelight, etc. Bibliography.

Textile Mills. The Lighting of Textile Mills, J. G. Oliver. Elec. Rev., vol. 150, no. 2590, July 15, 1927, pp. 91–93, 2 figs. Consideration of difficulties of electrical engineer in facing problem of mill lighting, and suggestions for their solution.

LOCOMOTIVES

Cylinder Losses. Cylinder Losses in Compound Locomotives. Ry. Engr., vol. 48, no. 571, Aug. 1927, pp. 313–315, 3 figs. An investigation based on tests made in service with an L.M.S.R. 3-cylinder 4–4–0 type engine.

Cylinders, Machining. Machining Locomotive Cylinders on a Pearn-Richards Machine. Brit. Machine Tool Eng., vol. 4, no. 45, May-June 1927, pp. 596–597, 1 fig. New method of machining cylinders that is finding much favor with those desirous of reducing production costs.

Design and Construction. Report on Locomotive Design and Construction. Ry. & Locomotive Eng., vol. 40, no. 7, July 1927, pp. 199–201. Standardization of fundamental parts of locomotives; rail stresses under locomotives; use of 3-cylinder vs. 2-cylinder locomotives provision for expansion of locomotive boilers on frames, and firebox supports; exhaust-steam ejectors; advantages and disadvantages of boiler pressures higher than 200 lb.; and development and use of oil-electric locomotives in railway service.

Diesel-Electric. A Diesel-Electric Locomotive of 400 Hp. for The Strade Ferrate Del Mediterraneo (Italy), F. Gubler. Brown Boveri Rev., vol. 14, no. 7, July 1927, pp. 175–180, 6 figs. partly on supp. pl. Locomotive is of the B-B type; framework for body is of rolled sections and rests on two two-axle trucks; engine is two-cycle machine of Fiat type, with six cylinders; output of Diesel engine is transmitted to driving wheels electrically, the Ward Leonard system being used.

Description and Tests of a New Diesel-Electric Locomotive in Service in Tunis (Description et essais d'une nouvelle locomotive Diesel électrique en service en Tunisie), L. Poullain. Revue Générale des Chemins de Fer, vol. 46, no. 1, July 1927, pp. 36–50, 11 figs. V-type Diesel engine built by Sulzer Bros. has 8 cylinders, 250 hp. and 550 r.p.m.; equipped with aluminum piston rings; direct connected to d.c. generator; results of acceptance and regular tests.

Diesel-Engined. Diesel Locomotives for Trunk Lines (Les locomotives Diesel à grand parcours), M. Seiliger. Technique Moderne, vol. 19, no. 14, July 15, 1927, pp. 417–424, 12 figs. Deals with Diesel-engined locomotives with minimum of 1000 hp.; difficulties encountered and how to overcome them.

Geared Diesel Locomotive and Its Tests (Die Diesel-Getriebelokomotive und ihre Erprobung), N. Dobrowolski. V.D.I. Zeit., vol. 71, no. 25, June 18, 1927, pp. 873–878, 12 figs. Design of locomotive; details of Diesel engine, cooling, lubrication, main coupling and gear transmission; results of tests at Düsseldorf; trial runs on sections of German state railway; results and conclusions.

Present Status of Diesel Locomotive Construction (Der gegenwärtige Stand des Diesellokomotivbaues), E. h. G. Lomonossoff. Zeit. des Vereines deutscher Ingenieure, vol. 71, no. 30, July 23, 1927, pp. 1046–1048, 2 figs. Principles of design and comparative weight and efficiency of four-cycle and two-cycle Diesel locomotives. Critical review of recent progress in design and research in Europe and America.

Fairlie. Modified Fairlie Locomotives, South African Railways. Ry. Engr., vol. 48, no. 571, Aug. 1927, pp. 299–303, 5 figs. These engines, which are of large proportions and develop tractive power of 46,140 lb., have recently been completed at the Works of Henschel & Sohn, Cassel, Germany.

4-8-4 Type. Canadian National Buys 4–8–4 Type Locomotives. Ry. Mech. Engr., vol. 101, no. 8, Aug. 1927, pp. 536–540, 8 figs. Also Ry. & Loco. Eng., vol. 40, no. 7, July 1927, pp. 189–191, 1 fig. Floating bushing bearings on main driver and truck journals; boilers of silicon steel carry 250 lb. pressure.

4-6-0 Type. New Four-Cylinder 4–6–0 Type Locomotive. Ry. & Locomotive Eng., vol. 40, no. 7, July 1927, p. 193, 1 fig. Most powerful locomotive for passenger service in Great Britain.

New 4–6–0 Type Express Passenger Locomotives, Great Western Railway. Ry. Gaz., vol. 47, no. 1, July 1, 1927, pp. 8–13, 8 figs. "Super-Castle" class with 67 tons 10 cwt. adhesion weight, boiler pressure 250 lb. per sq. in., and tractive effort 40,300 lb. See also Ry. Engr., vol. 48, no. 570, July 1925, pp. 251–260, 24 figs.; and Ry. Age, vol. 83, no. 6, Aug. 6, 1927, pp. 253–254, 2 figs.

New 4–6–0 Goods Locomotives, Southern Railway. Ry. Engr., vol. 48, no. 571, Aug. 1927, p. 305, 1 fig. General design of these engines similar to that for the "King Arthur" class 4–6–0 express passenger locomotives, and opportunity has been taken to make boiler, and as many as possible of detailed parts interchangeable with "King Arthur" class.

4-10-2 Type. A New Experimental 4–10–2 Type Locomotive. Ry. Engr., vol. 48, no. 571, Aug. 1927, pp. 306–310, 8 figs. Constructed on three-cylinder compound principle by Baldwin Locomotive Works.

Garratt. Garratt 2–6–0 0–6–2 Type Locomotives for the L.M.S.R. Ry. Engr., vol. 48, no. 570, July 1927, pp. 276–277, 1 fig. These engines, which have recently been introduced for working heavy freight trains on main line, are first employed for this class of service in United Kingdom.

Gasoline-Electric. Gasoline-Electric Locomotive (Verschiebelokomotive mit Explosions-motor und elektrischer Kraftübertragung), S. Dürrenberger. Elektrotechnische Zeit., vol. 48, no. 22, June 2, 1927, pp. 764–766, 8 figs. Arrangement of gasoline-driven yard locomotive with electric transmission between prime mover and driving wheels; motor is operated at constant output but variable speed; main generator receives its excitation from auxiliary axle-driven generator, which in turn derives its own excitation from storage battery; second storage battery, which is in series with main generator, supplies starting excitation.

Limited Cut-Off. Full Gear Versus Limited Cut-Off, H. J. Vincent. Ry. Age, vol. 83, no. 5, July 30, 1927, pp. 219–221, 4 figs. Discusses advantages obtained by limiting cut-off from standpoint of capacity and economy in locomotive operation.

Oil-Electric. Impressive Service Record of Oil-Engine Locomotives. Oil Eng. Power, vol. 7, no. 8, Aug. 1927, pp. 521–522, 1 fig. Railroad records on comparative performance of steam and oil-electric locomotives, surveyed for first time by Ingersoll-Rand Co., show to advantage of oil-electric type a possible saving of $337,000,000 per year. Oil-electric operating cost for fuel, oil, water, and other engine supplies found to be only one-fourth that of steam.

Smokeboxes. Smokebox Prevents Air Leaks. Ry. Mech. Engr., vol. 101, no. 8, Aug. 1927, pp. 533–535, 5 figs. Also Ry. Age, vol. 83, no. 4, July 23, 1927, pp. 149–150, 4 figs. Deflector plates and spark netting tongued and grooved to eliminate bolts; front end a steel casting.

Switching. A New Switching Locomotive. Ry. Age, vol. 83, no. 4, July 23, 1927, pp. 153–154, 2 figs. Oliver Iron Mining Co. gets highly developed unit; features of special interest in these locomotives are grate area of 63 sq. ft.; use of limited maximum cut-off of 70 per cent; application of tender booster; use of stoker, and inclusion in equipment of locomotives of feedwater heater.

Eight-Wheel Switch Engine with Large Boiler Capacity. Ry. Age, vol. 83, no. 6, Aug. 6, 1927, pp. 265–266, 2 figs. Indiana Harbor belt three-cylinder type handles longest trains over hump without splitting.

M

MACHINE SHOPS

Equipment. Shop Equipment Review. Am. Mach., vol. 67, no. 3, July 21, 1927, pp. 77–140, 483 figs. Semi-annual résumé of machines, tools and accessories described in Shop Equipment News section of this journal during first six months of 1927 includes index of manufacturers, and résumé of European equipment.

MACHINE TOOLS

Cutting Oils. Cutting and Soluble Oils, H. L. Kauffman. Am. Mach., vol. 67, no. 8, Aug. 25, 1927, pp. 305–307. Soluble oils are best coolants for machine-tool cutting operations; nature of oils and methods employed in their preparation; suggestions for their use.

Leipzig Fair. Machine Tools at the Leipzig Spring Fair, 1927 (Die Werkzeugmaschinen auf der Leipziger Frühjahrsmesse 1927), H. Häneke. V.D.I. Zeit., vol. 71, nos. 23 and 25, June 4 and 18, 1927, pp. 817–822 and 885–889, 29 figs. Tendency is toward rigidity of machine, greater work accuracy, improvement in appearance of machines, etc.; hydraulic drive is receiving greater attention; examples are given showing tendencies of design.

MACHINING METHODS

Airplane Engine Pistons. Methods of Machining Pistons for Airplane Engines, F. H. Colvin. Am. Mach., vol. 67, no. 7, Aug. 18, 1927, pp. 261–263, 8 figs. Fixtures, tools and methods of the Curtiss Aeroplane and Motor Co. that are well adapted for use in shops having a limited production.

Automobile Manufacture. One Way to Save Money in Automotive Manufacture, M. A. Hall. Automotive Mfr., vol. 49, no. 4, July 1927, pp. 5–7, 1 fig. Method followed by manufacturer of clutches and transmissions applied to bigger shops of complete vehicle makers would save thousands of dollars.

Turning. Turret and Auto-lathe Practice. Machy. (London), vol. 30, no. 772, July 28, 1927, pp. 521–525, 19 figs. Recent practice in the shops of Alfred Herbert, Ltd., Coventry.

MAGNESIUM

Commercial Possibilities. Magnesium. Metallurgist (Supp. to Engineer), June 24, 1927, pp. 81–82. Improvement of magnesium and its alloys, or of their treatment in regard to corrosion resistance stands in forefront of problems to be solved before serious advances can be made with those metals; it is, however, problem for investigator which should not prove ultimately beyond solution.

MALLEABLE IRON

Standardization. Tendencies in Malleable Iron Standardization (Ueber die Bestrebungen zur Normung von Temperguss), R. Stotz. Giesserei-Zeitung, vol. 24, no. 14, July 14, 1927, pp. 385–392, 18 figs. Compares mechanical properties of German malleable irons with those of American black- and white-heart iron; suggests that three quality standards, with proper minimum values of mechanical properties be recognized.

White-Heart. The Influence of Manganese and Manganese Sulphide on Whiteheart Malleable, E. R. Taylor. Foundry Trade Jl., vol. 36, nos. 568 and 569, July 7 and 14, 1927, pp. 23–24 and 41–44, 10 figs. Sulphur and manganese in black heart; influence of sulphur in white-heart malleable. Influence of manganese and manganese sulphide; influence of sulphide on fracture; loss or gain of sulphur during annealing.

MANGANESE STEEL

Low-Carbon. Alloys of Iron and Manganese Containing Low Carbon, Robert Hadfield. Iron and Steel Inst.—Advance Paper, May 1927, 65 pp. and supp. plates, 17 figs. Report of a research to ascertain definitely the properties conferred by manganese itself upon iron in the practical absence of carbon. See also Engineering, vol. 124, nos. 3211 and 3212, July 29 and Aug. 5, 1927, pp. 148–151 and 184–186, 13 figs.

MATERIALS HANDLING

Cost Reduction by. Cutting Your Handling Costs, G. E. Hagemann. Mfg. Industries, vol. 14, no. 2, Aug. 1927, pp. 99–102, 7 figs. Description of materials-handling methods that have saved money.

Gravel. Buffalo Gravel Corp. Has Unique System for Handling Materials. Rock Products, vol. 30, no. 16, Aug. 6, 1927, pp. 42–47, 18 figs. Raw material is received by Lake carriers and the products are loaded out for boat, truck, and railway shipment.

Hand-Lift Trucks. The Coördination of the Hand Lift Truck with Other Types of Handling Equipment, F. L. Eidmann. Indus. Mgmt. (N. Y.), vol. 74, no. 2, Aug. 1927, pp. 69–73, 13 figs. Examples of use of hand-lift truck; special-purpose lift trucks; savings accomplished.

Heavy Materials. Moving Heavy Materials Through Production Operations at the Otis Elevator Plant, R. J. Pearson. Indus. Mgmt. (N. Y.), vol. 74, no. 2, Aug. 1927, pp. 80–84, 14 figs. System of traveling cranes, motor trucks, and industrial trucks with special-purpose skid platforms.

Lift-Truck System. Lift-Truck System Cuts Handling Costs, W. C. Stuebing. Can. Machy., vol. 38, no. 2, July 14, 1927, pp. 25–27, 5 figs. One man with lift-truck system can do work of five men with old fashioned trucks, where latter require loading and unloading.

Railroad Shops. Material Handling System in a Railroad Shop. Am. Mach., vol. 67, no. 7, Aug. 18, 1927, pp. 275–277, 6 figs. System at Union Pacific Shops, Omaha, Nebr.

MERCURY VAPOR

Detection. A New Method for Detecting and Measuring Mercury Vapor, B. W. Nordlander. Nat. Safety News, vol. 16, no. 1, July 1927, pp. 37–38. Portable apparatus has been worked out by which standard conditions of test can be maintained constant; by means of this it is now possible to determine mercury-vapor concentration in any desired locality.

MERCURY-VAPOR PROCESS

Economies of. Economies of the Emmet Mercury Process, W. L. R. Emmet. Gen. Elec. Rev., vol. 30, no. 7, July 1927, pp. 339–341, 2 figs. Efficient means of enlarging existing plants; design of equipment; economies effected by use in combination with typical plants; results of application.

METAL DRAWING

Cold Working. Deformation Resistance of Cold Drawing (Der Formänderungswiderstand des Kaltziehens in Abhähgigkeit von Abnahmeverhältnis und Ziehwinkel), O. L. Weiss. Zeit. für Metallkunde, vol. 19, nos. 2 and 3, Feb. and Mar. 1927, pp. 61–67 and 94–100, 22 figs. Results of tests show that deformation resistance is dependent on drawing angle and reduction ratio; variability of deformation resistance can only be determined in relation to flow pressure and coefficient of friction; describes method of determining flow pressure.

METALS

Deformation and Stress Distribution. Surface Deformations and Stress Distribution in Tensile Test Pieces (Les déformations superficielles et la distribution des efforts dans les éprouvettes detraction.) Génie Civil, vol. 91, no. 1, July 2, 1927, pp. 10–13, 28 figs. Studies by Ch. Frémont which explain formation of lines in tensile test pieces and which permit deduction of method of investigation of stress distribution in metals.

Fracture. Cause of Formation of Internal Hollow Spaces in the Rupture of Tensile Test Pieces (La cause de la formation de la coupelle, dans la rupture des eprouvettes essayees a la traction), Frémont. Génie Civil, vol. 90, no. 19, May 7, 1927, pp. 453–456, 47 figs. Results of investigation of this type of fracture.

Work-Hardening Properties. Work-Hardening Properties of Metals, E. G. Herbert. Mech. Eng.,

vol. 49, no. 9, Sept. 1927, pp. 980–990, 26 figs. It is object of present work to correlate with operation of cutting tools certain well-established and generally recognized facts, chief among them being: metals are hardened by any process which deforms them so as to cause permanent change of shape while they are at low or moderate temperatures, a process referred to as "cold work;" that metals are deformed and are therefore hardened by cutting tools; that heat is generated by deformation of metals and in a preëminent degree by metal-cutting operations; and that degree of hardness induced by working metals with cutting tools, or otherwise, is greatly influenced by temperature at which deformation takes place.

MILLING

Automatic. Automatic Milling. Brit. Machine Tool Eng., vol. 4, no. 45, May-June 1927, pp. 615–619, 7 figs. Example of modern practice on modern machine.

MILLING MACHINES

Aluminum Working. Making Aluminum Casings with Plano Milling Machines (Die Bearbeitung von Aluminiumgehäusen auf Langfräsmaschinen), A. Pfeifer Maschinenbau, vol. 6, no. 12, June 16, 1927, pp. 608–610, 5 figs. Description and rate diagrams of special German types of vertical and horizontal machines which may be operated at speed of 600 r.p.m. or more.

German, 1927. New Designs of Plain Milling Machines (Neuere Bauarten von Einfachfräsmaschinen). Maschinenbau, vol. 6, no. 8, Apr. 21, 1927, pp. 387–390, 19 figs. Features and details of latest original German models exhibited in Leipzig in 1927.

Production Operations. Production Operations on a Modern Manufacturing Milling Machine. Brit. Machine Tool Eng., vol. 4, no. 35, May-June 1927, pp. 612–614, 4 figs. Typical and efficient manufacturing methods of production on a Parkinson No. 13 manufacturing milling machine.

MONEL METAL

Steam-Turbine Blades. Monel Metal for Steam Turbine Blades (L'emploi du metal Monel pour l'ailettage des turbines à vapeur). Génie Civil, vol. 90, no. 17, Apr. 23, 1927, pp. 416–417. Monel metal is used extensively for blades of steam turbines; its tensile strength ranges from 35 to 40 tons per sq. in. with extension of 30 per cent and elastic limit is between 22 and 27 tons per sq. in.; there is only small decrease in strength at temperatures concerned in steam turbines, and metal resists oxidation and pitting; data concerning experience with typical Monel-metal blades in marine and land turbines.

MOTOR BUSES

Germany. Technical Progress in Motor-Bus Construction (Die technische Weiterentwicklung des Kraftomnibusses), D. Przygode. Verkehrstechnik, vol. 40, no. 16, Apr. 22, 1927, pp. 245–249, 8 figs. Describes recent German types of "high-seat" (stepped-floor) one-story buses, low buses, electric and Diesel-engined buses; and gives list of characteristics of 4 and 6-cylinder trucks and motor buses of German make.

London Six. "London Six"—A Goliath of Motor Busses. Eng. & Amateur Mechanics, vol. 2, no. 40, July 29, 1927, pp. 233–234, 3 figs. To carry sixty-eight passengers on a six-wheel chassis.

New London Six-Wheel Bus Has Inter-Axle Differential, M. W. Bourdon. Automotive Industries, vol. 57, no. 3, July 6, 1927, pp. 90–91, 3 figs. Seats 68 passengers in fully enclosed double decks; Westinghouse air brakes operate on six wheels; rear springs are placed under frame.

Maintenance. A Maintenance System Which Gets Results, C. B. Lain. Bus Age, vol. 7, no. 5, May 1927, pp. 12–16, 8 figs. Reviews of inspection, maintenance, and overhauling methods used by the San Antonio Public Service Co. on its fleet of 43 buses.

Maudslay Saloon. Armchair Road Travel. Motor Transport, vol. 45, no. 1166, July 18, 1927, p. 77, 3 figs. Motorways latest Maudslay saloon which runs between Liverpool and London; light refreshments served on journey.

MOTOR TRUCKS

Cologne Show. The Cologne Exhibition of Transport Vehicles. Automobile Engr., vol. 17, no. 230, July 1927, pp. 238–253, 48 figs. Representative display of recent Continental designs, including many interesting developments.

Recent Models, Germany. Modern Motor Trucks and Their Appurtenances (Moderne Lastkraftwagen und Zubehör), Mangold. Fördertechnik u. Frachtverkehr, vol. 19, no. 13, June 24, 1927, pp. 229–234, 17 figs. Review of recent German models exhibited at the Cologne motor show, including motor trucks with Cardan drives, trailers for passenger cars, trailers of unusual capacity, trucks powered with Diesel motors, etc.; descriptions of designs of springs, air filters, self patching tire tubes, graphical operation recorders, etc.

Renault. New Renault Models. Motor Transport, vol. 44, no. 1162, June 20, 1927, pp. 733–734, 6 figs. Additions and modifications to wide range of French chassis for British users.

Six-Wheel. Progress in Six-Wheeler Design. Motor Transport, vol. 44, no. 1163, June 27, 1927, pp. 759–762, 12 figs. New Scammell rigid-framed 4–7 tonner with single axle, 4-wheel drive and transverse sprung front axle.

Federal. Federal Adds Three Six-Cylinder High Speed Truck Models, A. F. Denham. Automotive Industries, vol. 57, no. 3, July 16, 1927, pp. 82–83, 2 figs. Interchangeability of four and six-cylinder engines features new jobs; one one-ton and two two-ton models included; one two-ton has worm drive, others have bevel.

N

NICKEL STEEL

Nickel-Chromium-Molybdenum. The Properties of Some Nickel-Chromium-Molybdenum Steels, J. H. Andrew, M. S. Fisher and J. M. Robertson. Iron & Coal Trades Rev., vol. 114, no. 3092, June 3, 1927, pp. 892–893. Deals with properties of two series of steels; in both series percentages of chromium and molybdenum were constant, and nickel increased from 2 to 5 per cent; thermal data; mechanical properties. Abstract of paper read before Iron and Steel Inst.

NON-FERROUS METALS

Castings, Stresses in. Stresses in Non-Ferrous Castings, C. H. Desch. Metal Industry (Lond.), vol. 31, no. 2, July 15, 1927, pp. 28–30, 3 figs. Contraction data of chief metals; brittle range; intercrystalline stress; beta brass structure. Paper read at Institute of British Foundrymen.

O

OIL ENGINES

Acro-Bosch. New Combustion Principle in Acro-Bosch Oil Engine. Oil Eng. Power, vol. 7, no. 8, Aug. 1927, pp. 533–536, 4 figs. Exhaustive tests throw new light on performance of air chamber in piston.

Airless Injection. A 675 B.H.P. Airless Injection Oil Engine for British Columbia. Engineer, vol. 144, no. 3734, Aug. 5, 1927, pp. 156–157, 4 figs. Built by Campbell Gas Engine Co., Ltd., at Halifax for Vancouver Station of the British Columbia Electric Light and Power Co., Ltd. Westinghouse 2300-volt, three-phase, 60-cycle alternators, designed for an output of 450 kw. at 0.8 power factor, synchronous speed 225 r.p.m.

Crossley-Premier. A Horizontal Auxiliary Type Heavy-Oil Engine. Mar. Engr. & Motorship Bldr., vol. 50, no. 599, July 1927, pp. 270–273, 3 figs. Crossley-Premier airless-injection engine, designed and built by Premier Gas Engine Co.

Deutz. The Deutz Standard Marine Oil Engine (Die Deutzer 6-Zylinder-Einheits-Dieselmaschine, 950 Ps, für ortsfesten und Schiffsbetrieb), H. Neumann. Werft—Reederei—Hafen, vol. 8, no. 11, June 7, 1927, pp. 242–244, 9 figs. 950-hp. 6-cylinder solid-injection Diesel engine, which is so standardized that it is applicable either for marine or land work; features of design, and how its final application is made to satisfy conditions imposed by standardization and advantages accruing therefrom. See translated abstract in Mar. Eng. & Motorship Bldr., vol. 50, no. 599, July 1927, p. 277.

High-Speed. Latest Campbell Generator Engine. Mar. Eng. & Motorship Bldr., vol. 50, no. 600, Aug. 1927, pp. 308–310, 3 figs. High-speed airless-injection four-stroke cycle unit of straightforward design.

The High-Speed Oil Engine, H. F. Shepherd. Mech. Eng., vol. 49, no. 9, Sept. 1927, pp. 991–994, 11 figs. Some notes on design, research, and shop practice.

Power Costs. Power Costs with Modern Oil Engines, Edgar J. Kates. Oil Eng. Power, vol. 7, no. 8, Aug. 1927, pp. 530–532. Importance of basing cost studies on up-to-date records.

OIL FUEL

Combustion. The Chemistry of Oil Combustion, P. E. Fansler. Heat. & Vent. Mag., vol. 24, nos. 6 and 7, June and July 1927, pp. 63–65 and 72–74. Present-day theory identifies gasified hydrocarbons as elementary fuel.

P

PAINTS

Protective Coatings, Testing of. Regular Examination of Protective Paint Coatings (Laufende Untersuchung von Rostschutzanstrichen), K. Wistinghausen. Korrosion u. Metallschutz, vol. 3, no. 6, June 1927, pp. 134–138, 3 figs. Describes portable electrical apparatus "Rostsucher Penetrator," put on market by Institute of Paint Technology of Stuttgart, for testing of paint coatings by measuring their water permeability.

PATENTS

German Patent Bureau. 50 Years of the German Patent Bureau (Fünfzig Jahre Patentamt), B. Rösing. V.D.I. Zeit., vol. 71, no. 26, June 25, 1927, pp. 909–913, 1 fig. Development of patent system in Germany and other countries; inauguration of German Patent Bureau under influence of industrial and technical federations; development of Bureau and its importance in economic system.

PIPE LINES

Corrosion. Prevention of Corrosion in Steel Pipe Line, W. K. Weller. Water Works, vol. 66, no. 7, Aug. 1927, pp. 342–343, 1 fig. How deaeration process is used on 350-mi. line in Western Australia described in paper presented Feb. 27 at annual conference of Institution of Engineers, Australia.

Expansion Joints. Applications of the Modern Expansion Joint, H. L. Alt. Heating & Ventilating Mag., vol. 24, no. 8, Aug. 1927, pp. 83–85, 7 figs. How these devices compare with pipe bends in solving piping problems both above and below ground.

PISTONS

Light-Alloy. Light-Alloy Pistons, G. D. Welty. Soc. of Automotive Engrs.—Jl., vol. 21, no. 2, Aug. 1927, pp. 146–150, 1 fig. Lightweight and high conductivity; design of aluminum pistons; installation; magnesium-alloy pistons.

PLANERS

Milling Machines, vs. To Plane or to Mill? (Hobeln oder fräsen?), F. Bahlecke. Werkstattstechnik, vol. 21, no. 8, Apr. 15, 1927, pp. 225–226, 1 fig. Mathematical analysis of factors influencing time economy of two processes from which alignment chart is developed for solving working-time problems.

Open-Side. Butler 12-ft. by 4-ft. Square Open-side Planing Machine. Machy. (London), vol. 30, no. 772, July 28, 1927, pp. 535–536, 3 figs. Also Brit. Machine Tool Eng., vol. 4, no. 45, May-June 1927, pp. 608–611, 4 figs. Description of a 12 by 4 ft. square open-side planing machine built by Butler Machine Tool Co., Ltd., Halifax.

POLISHING

Principles Involved. The Prerequisites of Successful Polishing, B. H. Divine. Mech. Eng., vol. 49, no. 9, Sept. 1927, pp. 975–979. Author discusses those conditions which must be obtained in polishing department to procure highest quality of work, with least cost of material and wages; most important consideration in successful polishing is glue used in bonding abrasive to wheel and its treatment; next most important consideration is selection of abrasive; these are discussed in detail; other important factors are: design of article to be polished, relation of operations preceding polishing, absence of vibration, housing of polishing department, polishing machines, automatic polishing, and polishing tools.

POWER PLANTS

Savings in. Saving Money in the Power Plant, H. E. Collins. Mfg. Industries, vol. 14, no. 2, Aug. 1927, pp. 129–131. In three instances savings give yearly return of 58.5, 58, and 37 per cent on cost of new equipment; coal and ash-handling machinery; in four instances savings in operating expenses are 23, 19, 13.5, and 11.8 per cent.

PRINTING MACHINERY

Presses. Pressroom Progress Through Better Equipment, T. E. Dunwody. Inland Printer, vol. 79, no. 5, Aug. 1927, pp. 777–784, 5 figs. Development in printing presses during last quarter century; ink and conditions affecting them; other devices and accessories.

Typesetting Machines. The Typesetting Machine and Its Production, F. M. Sherman. Inland Printer, vol. 79, no. 5, Aug. 1927, pp. 775–776. A historical review.

PSYCHOLOGICAL TESTS

Employees. New Psychological Tests. Eng. & Contracting, vol. 66, no. 6, June 1927, pp. 244–245. How man's vocational fitness is determined.

PULVERIZED COAL

Hydrocarbons, Retention of. The Retention of Certain Hydrocarbons by Solid Fuels, B. Moore and F. S. Sinnatt. Fuel, vol. 6, no. 7, July 1927, pp. 312–318, 28 figs. Results of investigations show that relative amounts of vapor which fuels examined are capable of absorbing and retaining vary with type of fuel; most of absorbed vapor is easily removed, although measurable amount is retained during considerable periods of exposure to air; pre-treatment of fuels with hydrocarbons used has practically no influence upon capacities of fuels for absorbing moisture, but decreases slightly tendency of coals to ignite.

Marine Boilers. Pulverised Fuel for Marine Purposes, J. C. Brand. Shipbldg. and Shipg. Rec., vol. 30, no. 3, July 21, 1927, pp. 67–70 and (discussion), pp. 82–83, 3 figs. Types of fuel suitable for pulverization and effect of grinding, preheating, turbulence, and moisture on combustion in confined spaces. Details of a successful system evolved in Australia for bunkering, unbunkering, and burning powdered fuel in Scotch boilers. Particulars of tests given, and question of use of unit pulverizers on board ship discussed. See also Mar. Eng. & Motorship Bldr., vol. 50, no. 600, Aug. 1927, pp. 286–291, 3 figs.

Plants. Up-to-the-Minute Powdered Coal Plant. Black Diamond, vol. 79, no. 6, Aug. 6, 1927, pp. 14–15, 3 figs. S. D. Warren Co., Cumberland Mills, Me., uses CE unit pulverizers grinding 5000 lb. per hr.; burner is No. 3 Couch rotary type; coal is not dried.

Pulverizers. A New Coal Pulverizer (Sopra un Nuovo Ploverizzatore Del Carbone), P. Barbacini. Industria, vol. 41, no. 12, June 30, 1927, pp. 323–325, 5 figs. Description of "Resolutor" pulverizer consisting of single crushing wheel and air-current grades; mechanism designed to eliminate pulverized coal as soon as required degree of fineness has been attained.

PUMPING STATIONS

Design and Future Development. Modern Pumping Station Design and Its Probable Future Development, A. L. Mullergren. Am. Water Works Assn.—Jl., vol. 18, no. 2, Aug. 1927, pp. 180–192. Also Can. Engr., vol. 53, no. 1, July 5, 1927, pp. 105–108. Changes in design of large pumping stations has been brought about by increasing use of high temperatures and pressures and rapid development of steam turbine and centrifugal pumps; present tendencies of pumping-station design along those of central electric power station.

PUMPS, CENTRIFUGAL

Automatic Control. Notes on the Automatic Operation of Centrifugal Pumps, E. B. Wagner. General Elec. Rev., vol. 30, no. 8, Aug. 1927, pp. 370–374, 1 fig. Application of automatic control to mine pumping plants; inter-relation of hydraulic and electrical devices; general requirements; control-circuit diagram; operation and adjustment of devices.

Characteristics. Characteristics of Centrifugal Pumps, H. F. Meeker. Ice & Cold Storage, vol. 30, no. 353, Aug. 1927, pp. 203–206, 3 figs. The size and type required and other useful information for the refrigerating engineer.

Efficiency. Centrifugal Pump Efficiency, L. G. L. Thomas. Armour Engr., vol. 18, no. 3, Mar. 1927, pp. 88–90, and 116, 6 figs. Pump must be carefully selected if efficient operation is to be secured. Pump impeller must rotate at speed sufficient to lift water to desired height. Author considers method of pump selection which will insure economical results.

Electric. Electric Pumps for Standby Service, W. E. Davis. Can. Engr., vol. 53, no. 2, July 12, 1927, pp. 125–127. Economies effected by installation of motor-driven centrifugal pumps in water-works plants; comparison between three plants operating under different conditions. Paper presented before Am. Water Works Assn.

Operating Costs. Cost of Operating Motor Driven Centrifugal Pumps, L. Hudson and A. J. Richards. Water Works, vol. 66, no. 8, Aug. 1927, pp. 339–341. Data on pumping operations at McKeesport, Pa., given in paper presented before Central States Section of Am. Water Works Assn.

Selection. Guaranteed Efficiencies Do Not Afford a True Basis for Comparing Centrifugal Pumps, G. H. Gibson. Textile World, vol. 72, no. 6, Aug. 6, 1927, p. 74. Pump with discharge nozzle smaller than suction nozzle may give too good a showing.

Self-Starting. New Pump is Self-Priming. Power, vol. 66, no. 4, July 26, 1927, p. 151, 2 figs. By combining water-ring pump, also known as Elmo air pump, with ordinary centrifugal pump, German manufacturer has built unit which is claimed to be self-priming and self-starting, thus removing long-time limitation, and allowing centrifugal pump to be used where previously its application was impossible.

R

RAILS

A.R.E.A. Report on. Report of Committee IV—Rails, E. Stimson. Am. Ry. Eng. Assn.—Bul., vol. 28, no. 295, Mar. 1927, pp. 915–919. Revision of manual; details of mill practice and manufacture as they affect rail quality; rail failures; transverse fissures; cause and prevention of rail battering; gas welding of propulsion and signal bonds; economic value of different rail sections.

Heat Treatment. The Heat Treatment of Steel Rails. Metallurgist (Supp. to Engineer), July 1927, pp. 104–105, 1 fig. Heat treatment of steel rails by the Sandberg process; abstracted from Rev. de Met., Jan. and Feb. 1927, pp. 10–19 and 68–78.

Stresses. Stress in Rails Has Important Bearing on Failures. Ry. Age, vol. 83, no. 3, July 16, 1927, pp. 107–108, 3 figs. Records kept by P. & L. E. show that breakages vary with the relation of wheel loads to stiffness of sections.

Wear. The Problem of Railway Wear. Ry. Engr., vol. 48, no. 570, July 1927, pp. 278–279. Facts indicate that mere carbon hardness is not prime requisite in steel-rail composition, but that manganese plays a greater part than carbon in producing that toughness that is best fitted to withstand peculiar combination of pounding and rubbing which rail suffers when in service; specified "higher carbon" compositions of British Standard Specifications should be subdivided, and definite manganese percentages specified, somewhat after this fashion.

RAILWAY ELECTRIFICATION

France. Electrification of Railways of the South of France (L'Electrification des Chemins de Fer du Midi). Génie Civil, vol. 91, nos. 5 and 6, July 30 and Aug. 6, 1927, pp. 105–115 and 133–138, 26 figs. History and present state of lines and equipment of electrified system of the Compagnie des Chemins de Fer du Midi; description of principal hydroelectric plants, substations, transformer stations, towers, and high-tension lines carrying voltages as high as 150,000 v.; description of electric cars and locomotives and table of main characteristics of electrical locomotives.

RAILWAY MOTOR CARS

Gasoline-Electric. New Double-Unit Petrol-Electric Cars, J. W. Inglis. Tramway & Ry. World, vol. 61, June 16, 1927, pp. 291–293, 4 figs. Brill-Westinghouse cars with two power units.

RAILWAY REPAIR SHOPS

Illinois Central, at Paducah, Kentucky. Illinois Central Builds Large Shops at Paducah. Ry. Age, vol. 83, no. 6, Aug. 6, 1927, pp. 256–261, 8 figs. New locomotive and car facilities replace all units of old repair plant at same point.

Labor-Saving Facilities. Rock Island Repair Shop Has Many Labor-Saving Facilities. Ry. Elec. Engr., vol. 18, no. 8, Aug. 1927, pp. 241–243, 7 figs. Electric baking oven is supported from chain hoist to assist in placing and removing armatures; "pickling" tank is electrically heated.

RAILWAY SHOPS

Air Compressors. Yard Compressors Save Money at Busy Freight Terminals. Ry. Elec. Engr., vol. 18, no. 8, Aug. 1927, pp. 245–248, 7 figs. Estimated savings average more than 30 per cent on the investment; automatic control features permit their use at outlying points.

B. & A., West Springfield, Mass. Boston & Albany Blacksmith Shop at West Springfield. Ry. Mech. Engr., vol. 101, no. 8, Aug. 1927, pp. 555–558, 8 figs. Considerable attention has been given to the heat treatment of locomotive parts and small tools.

RAILWAY SIGNALING

A.R.A. Reports. Instructions (Committee V). Am. Ry. Assn.—Signal Section Proc., vol. 25, no. 1, Aug. 1927, pp. 50–101, 12 figs. Reports on following subjects: Book on signaling: Chapter VII—direct current track circuits: Chapter XXIII—highway-crossing protection; definitions of technical terms used in signaling.

Signaling Practice (Committee X). Am. Ry. Assn.—Signal Section Proc., vol. 25, no. 1, Aug. 1927, pp. 5–41, 10 figs. Reports on following subjects: Automatic train control; definitions for display of light signal indications and aspects; requisites for display of light signal indications and aspects; signal aspects, signal indications and names of indications.

Automatic. Seaboard Installs Automatics with A-C Floating for Signals and Primary Battery for Track. Ry. Signaling, vol. 20, no. 8, Aug. 1927, pp. 293–298, 16 figs. Layout of signaling; parkway construction at rail and switch-box connections; poles and line equipment; submarine cables; power distribution; power supply; substation equipment; bonding.

Automatic Block. Direct Current Automatic Block Signaling (Committee IV). Am. Ry. Assn.—Signal Section Proc., vol. 25, no. 1, Aug. 1927, pp. 110–126. A.R.A. reports on following subjects: Revision of A.R.A. signal division specification 10520; revision of R.S.A. specification 5716; revision of A.R.A. signal division specification 10620.

Mechanical Interlocking. Mechanical Interlocking (Committee II). Am. Ry. Assn.—Signal Section Proc., vol. 25, no. 1, Aug. 1927, pp. 144–170. A.R.A. report on revision of R.S.A. specification 6618.

Power Interlocking. Power Interlocking (Committee III). Am. Ry. Assn.—Signal Section Proc., vol. 25, no. 1, Aug. 1927, pp. 187–254, 8 figs. A.R.A. reports on revision of R.S.A. specification 6518; typical circuits for power interlockings; specification for automatic signal protection for railroad grade crossings.

Train Control. Automatic Train Control in the United States. Ry. Engr., vol. 48, no. 571, Aug. 1927, pp. 311–312 and 315, 1 fig. Installations of continuous-inductive type on the Philadelphia & Reading and Atchison, Topeka & Santa Fe systems.

Santa Fe Train Control Aids Traffic. Ry. Age, vol. 83, no. 6, Aug. 6, 1927, pp. 244–248, 5 figs. Train movements directed by cab signal indication in either direction on double track without intermediate wayside signals.

Santa Fe Is Operating Trains by Cab Signaling with Train Control, G. K. Thomas. Ry. Signaling, vol. 20, no. 8, Aug. 1927, pp. 283–292, 7 figs. Capacity of double-track line increased substantially by either-direction operation without wayside signals.

The Present Status of Train Control, G. E. Ellis. Ry. Signaling, vol. 20, no. 8, Aug. 1927, pp. 303–305. Progress made; future of train control.

RAILWAY TIES

Concrete. Pennsylvania Starts Extensive Tests of Concrete Ties. Ry. Eng. & Maintenance, vol. 23, no. 3, Aug. 1927, pp. 333–335, 3 figs. Is now installing several thousand substitute ties in main tracks on the eastern and central regions; design of tie which is to carry locomotive wheel load of 127,200 lb. (including impact allowance).

RAILWAY TRACK

Inspection Car. A.T. & S.F. Track Inspection Car Has Interesting Features. Ry. Eng. & Maintenance, vol. 23, no. 3, Aug. 1927, pp. 316–321, 10 figs. Makes graphical record of various characteristics of track for guidance of track forces; cyroscope has been utilized to record differences in cross level of rails at high speed.

Scales. Progress in Construction of Track Scales (Fortschritte im Bau von Gleiswiegevorrichtungen), M. Raudnitz. V.D.I. Zeit., vol. 71, no. 29, July 16, 1927, pp. 1019–1022, 10 figs. Track scale of new design requiring no break in track compared to old design of same type of scale, showing 13 to 21.5 per cent saving in material and simpler construction due mostly to substituting double lever arms for usual single lever arms; characteristics and rating of new scale.

REFRACTORIES

Industrial Furnaces. Troubles of the Furnace Builders with Refractories. Forging—Stamping—Heat Treating, vol. 13, no. 6, June 1927, pp. 231–233. Conditions that exist in certain types of furnaces are considered together with character of refractories that will meet these conditions; deals with underfired normalizing furnaces, enameling furnaces, brass-melting furnaces.

REFRIGERATING MACHINES

Testing Apparatus For. Investigation of an Efficiency Testing Apparatus for Refrigerating Machines (Untersuchung eines Leistungsprüfers für Kältemaschinen der Gesellschaft für Lindes Eismaschinen Aktiengesellschaft, Wiesbaden), R. Stückle. Zeit. für des gesamte Kälte-Industrie, vol. 34, no. 6, June 9, 1927, pp. 102–105. Description of new German apparatus and detailed tabular record of two tests showing error of corrected indications of testing apparatus to be less than 1 per cent (0.57 to plus 0.20 per cent).

REFRIGERATING PLANTS

Electric. Electrical Driving of Refrigerating Plant. Ice & Cold Storage, vol. 30, no. 353, Aug. 1927, pp. 201–202. Some points on the characteristics of a.c. and d.c. motors.

REFRIGERATION

Direct Heat Application. Refrigeration by Direct Application of Heat, H. E. Keeler. Am. Gas Jl., vol. 127, no. 3, July 16, 1927, pp. 56–61. Fundamental principles and discussion of commercial aspects of subject.

Domestic. Household Refrigeration. A Study of the Factors Affecting the Capacity and Efficiency of Small Reciprocating Compressors, L. A. Philipp and C. C. Spreen. Refrig. Eng., vol. 14, no. 2, Aug. 1927, pp. 61–70 and 75, 8 figs. Confirms previous results with new data; defines compression efficiency, mechanical efficiency, overall compressor efficiency, Carnot efficiency, performance factor; compares results of two cases—variable and constant room temperature—to show the effect of this factor on capacity. The volumetric efficiencies measured are compared with those obtaining when air is fluid compressed.

REFRIGERATION

Ottesen Process. New Research on the Conserving of Meat by the Ottesen Freezing Process (Neue Untersuchungen über die Konservierung von Fleisch durch das Ottesen-Gefrierverfahren), E. Oestert. Zeit. für die Gesamte Kälte-Industrie, vol. 34, no. 5, May 9, 1927, pp. 84–88. Ottesen glycerine-brine process of meat freezing; method of combating surface discoloration of frozen meat by means of harmless addition of ammonia or some other alkali.

RESEARCH

Academic and Industrial. Research, R. E. Rose. Science, vol. 66, no. 1701, Aug. 5, 1927, pp. 117–122. Presented at a joint meeting of the Rhode Island Sections of the Am. Chemical Soc. and the Am. Assn. of Textile Chemists and Colorists.

ROLLING MILLS

Blooming Mills. Blooming Mills Given Electric Drive. Iron Age, vol. 120, no. 4, July 28, 1927, pp. 203–204, 1 fig. Reversing motor of 4000 hp. installed by Bourne-Fuller Co.; better product reported at lower cost.

New Three-High Blooming Mill at the Works of Societa Italiana Ernesto Breda, Milan. Iron & Coal Trades Rev., vol. 14, no. 2095, June 24, 1927, pp. 994–995, 5 figs. Designed to roll blooms weighing up to 2 tons; electric driving equipment; roll adjustment; lifting-table equipment; bloom tilting and shifting device.

Three-high Blooming and Slab-blooming Mill. Mech. World, vol. 82, no. 2118, Aug. 5, 1927, pp. 96–99, 8 figs. The Societa Italiana Ernesto Breda, of Milan, recently enlarged rolling plant; three-high blooming and slab-blooming mill suited for dealing with blooms weighing up to 2 tons each.

ROLLING MILLS

Operation. Reversing Blooming Mill Practice, G. A. V. Russell. Iron Age, vol. 120, no. 9, Sept. 1, 1927, pp. 543–545, 3 figs. Drafts for heavy ingots; small-diameter rolls for proper economy; proportioning of roll passes.

Sheet Bar. Changing Mills with Minimum Delay. Iron Age, vol. 120, no. 7, Aug. 18, 1927, pp. 394–396, 6 figs. Careful preparation of an operating schedule and a construction program enabled the Inland Steel Co. to switch from an existing 24-in. three-high mill to a new 19-in. continuous sheet bar mill with an interruption of only 12 days in production.

Sheet Mills. Continuous Sheet Mill at Ashland, Ky., C. Longenecker. Blast Furnace & Steel Plant, vol. 15, no. 7, July 1927, pp. 335–338, 9 figs. Methods involved are explained, from casting of ingot to finished sheet.

Minimizes Heating Costs of Steel Sheets, F. W. Manker. Iron Trade Rev., vol. 81, no. 4, July 28, 1927, p. 200, 1 fig. Development of new and modern equipment for efficient and economical utilization of gas fuel at plant of the West Penn Steel Co., Brackenridge, Pa.; soaking pits, sheet and pair furnaces, box-annealing furnaces and drying ovens, all are fired with gas.

Soaking Pits. Soaking Pit with Recuperator. Blast Furnace & Steel Plant, vol. 15, no. 7, July 1927, pp. 347–349, 2 figs. Recuperation applied to "pits" in European plants with satisfactory results; installation in American mill increases efficiency; advantages pointed out.

Structural Steel. Carnegie Structural Mill at Homestead, R. H. Wright. Blast Furnace & Steel Plant, vol. 15, no. 7, July 1927, pp. 331–334. By electrical applicances, mills at Munhall are started from New York City; production of steel outlined; project involves complete reconstruction of department used in production of structural steel.

Wire-Rod. Making of Wire Rods, G. A. Richardson. Wire, vol. 2, no. 7, July 1927, pp. 230–232, 6 figs. Improved methods and machinery at Sparrows Point plant of Bethlehem Steel Co.

ROLLS

Ragging. "Ragging" of Rolls (Walzenschärfen), H. Cramer. Stahl u. Eisen, vol. 47, no. 14, Apr. 7, 1927, pp. 582–586, 10 figs.; also translation in Blast Furnace & Steel Plant, vol. 15, no. 7, July 1927, pp. 326–328, 10 figs. Efficiency of rolls increased by "ragging;" best form of "ragging;" relation of speed

of rolls, ingot and lapping of ragging; explanation of lapping.

Wear of. Wear of Blooming-Mill Rolls, H. Cramer. Iron & Coal Trades Rev., vol. 115, no. 3098, July 15, 1927, pp. 96–98, 9 figs. Wear of rolls in service is made good by turning them down; to restore original width in worn roll passes are cut with sloping sides, thus tapering off rolls to certain extent; one way of minimizing quantity of roll metal to be removed is described for three-high blooming mill. Translated from Stahl u. Eisen.

S

SAND BLAST

Suction vs. Pressure Systems. Suction vs. Pressure Systems (Saugsystem oder Drucksystem), H. R. Karg. Giesserei, vol. 14, no. 27, July 2, 1927, pp. 463–466. Discusses advantages and disadvantages of both systems.

SCALES

Track. Pennsylvania Builds the First Plate Fulcrum Master Scale. Ry. Age, vol. 83, no. 4, July 23, 1927, pp. 136–140, 7 figs. New weighing device with unusual accuracy and sensitivity.

SCREWS

Driving Stresses. Screw Driving Stresses (Anzugspannung und deren Bedeutung bei der Arbeit der Schraube), W. Köhler. Bergmann Mitteilungen, vol. 4, no. 6, Nov.–Dec. 1926, pp. 223–229, 4 figs. Derives formula for stresses in screw caused by driving and gives results of tests showing deformation of driven screw and effects of discontinuance of driving for a number of hours.

Wood, Holding Power of. Holding Power of Wood Screws (Die Haftkraft der Holzgewinde-Schrauben), J. Eckert. Werkstattstechnik, vol. 21, no. 12, June 15, 1927, pp. 345–350, 11 figs. On basis of many tests, author develops simple formula for holding power, in kilograms per 100 mm. of thread length, of many species of timber for screws driven in side or end grain, tangentially or radially, with reference to wood fibers.

SEAPLANES

Floats. Floats for Seaplanes, Especially Applicable to Nordic Conditions (Om flottörer för sjöflygplan med särskild tanke pa vara nordiska Förhallanden), G. Spaak. Teknisk Tidskrift (Allmänna Avdelningen), vol. 57, no. 28, July 16, 1927, pp. 237–240, 3 figs. Construction problems for seaplane floats, suitable for different seasons.

SHAFTS

Vibration Calculation. Computing the Period of Vibration of a Flexible Shaft Bearing Several Loads (Berechnung der Biegungsschwingungszahl einer Welle, die mit mehreren Lasten behaftet ist), O. Föppl. Zeit. für angewandte Mathematik u. Mechanik, vol. 7, no. 1, Feb. 1927, pp. 72–77, 3 figs. Derives mathematical formulas for shafts and beams, variously constrained and loaded, to enable machine designer to avoid condition of resonance of shaft vibrations with revolution frequency of machine.

SHAPERS.

Crank. Kelly 26- and 32-Inch N.T. Crank Shapers. Am. Mach., vol. 67, no. 5, Aug. 4, 1927, pp. 207–208. Machines are equipped with plates at back of column for bolting motor for motor drive; single-pulley drive can also be obtained.

SHEARS

Plate. Plate Shearing Machines. Mech. World, vol. 81, no. 2105, 2108, 2110, and 2113, May 6, 27, June 10, and July 1, 1927, pp. 317–318, 372–373, 407 and 4, 8 figs. Main features of design in machines for shearing heavy steel plates when these are delivered from rolling mill.

SMOKE ABATEMENT

Methods. The Future of Coal and Its Relation to Smoke Abatement. Heating & Ventilating Mag., vol. 24, no. 8, Aug. 1927, pp. 88–89, 4 figs. What science is doing to eliminate objections to use of this fuel in every increasing quantity.

SPRINGS

Automobile. Springs (Das Federproblem), F. Meineke. Motorwagen, vol. 30, no. 14, May 20, 1927, pp. 313–319, 18 figs. Examination of action of ordinary leaf springs shows danger of too large rebounds; this can be overcome by counter leaves; while counter leaves give strong springs and reduce oscillation to minimum number, they also give hard riding unless balloon tires are used; better solution is so-called rolling springs, which bear on shaped pads or on rollers at middle or at ends; by properly arranging these carrying organs a spring of equal softness throughout its range can be produced; three arrangements of such springs are described; best shock absorber for use with coil springs is hydraulic kind. See brief translated abstract in Automotive Abstracts, vol. 5, no. 7, July 20, 1927, p. 218.

STANDARDS

German D.I.N. Reports. Report of German Industrial Standards Committee (DIN Mitteilungen), W. Reichardt. Maschinenbau, vol. 6, no. 11, June 2, 1927, pp. 581–588, 6 figs. Proposed standards for methods of testing refractory building materials, globe valves, seamless ingot steel pipes, stuffing-box packing space; pipe flanges.

STAYBOLTS

Hollow Bars. Seamless Hollow Rolled Staybolt Bars. Boiler Maker, vol. 27, no. 7, July 1927, p. 200, 3 figs. Patented process to manufacture on production basis hollow staybolt iron; process consists essentially of building up hollow fagot by arranging rods around hollow metal core, heating fagot to welding and rolling temperature, rolling heated fagot down to required size, at same time preserving desired direction of hole through axis of bar.

STEAM

Conversion. Conversion of Superheated Steam into Saturated Steam (Die Umformung des Heissdampfes in Sattdampf), H. F. Lichte. Wärme- u. Kälte-Technik, vol. 29, no. 11, June 1, 1927, pp. 137–141, 5 figs. Advantages of transforming and raising pressure of steam illustrated by practice of briquetting plant and paper mill; description of "Spuhr" steam transforming process.

High-Pressure, Generation of. The Industrial Production of High Pressure Steam (La Production Industrielle de la Vapeur D'eau à Haute Pression), C. Roszak and M. Veron. Societe des Indenieurs Civils de France—Memoires et Compte Rendu des Travaux, vol. 79, nos. 1 and 2, Jan.-Feb. 1927, pp. 34–366, 80 figs. Theory of high-pressure steam, advantages and disadvantages of high steam pressure; history and present status of practice of generating high-pressure steam.

STEAM ACCUMULATORS

Systems. Development and Application of Thermal Storage (Die Entwicklung der Wärmespeicher und deren Verwendung), H. E. Witz. Elektrotechnische Zeit., vol. 48, no. 12, Mar. 24, 1927, pp. 381–383, 11 figs. Two systems are described in which hot water is stored in large cylindrical tanks; in one arrangement exhaust steam from back-pressure engines is used for heating water in storage vessel, from which hot water is drawn for process purposes; supply of cold water and final temperature are controlled with thermostats; in other system one or more water-tube boilers are used in conjunction with storage vessel maintained at boiler pressure; when demand for steam is low, feed to boiler is maintained and surplus hot water overflows into storage tank, from which it is returned to boiler when steam requirements are above normal.

STEAM ENGINES

Back-Pressure. Increasing the Efficiency of Back-Pressure Engines (Leistungserhöhung von Gegendruckmaschinen), E. Praetorius. Centralblatt der Hütten u. Walzwerke, vol. 31, no. 20, May 18, 1927, pp. 265–268, 5 figs. Suggests lowering of back pressure, raising of initial pressure, raising temperature of fresh steam; and higher temperatures, in general, making use of mercury, diphenyloxide or other non-aqueous vaporizing media.

Economy. High-Pressure Reciprocating Engines, Charles R. King. Engineer, vol. 144, no. 3733, July 29, 1927, pp. 129–130. Contains a tabular recapitulation of published results of steam-engine tests.

High-Temperature Steam in. Reciprocating Engine Using 600-Degree Steam Gives Excellent Results. Power, vol. 66, no. 8, Aug. 23, 1927, pp. 291–293, 2 figs. Operating data and test results of a cross-compound poppet-valve Corliss engine driving 1000-kw. generator, and using steam 350 to 420 lb. pressure and temperature of 600 deg. fahr.

Uniflow. Unaflow Engines, R. Trautschold. Paper Trade Jl., vol. 85, no. 3, July 21, 1927, pp. 36–40, 2 figs. Some examples of savings by use of uniflow engines.

STEAM POWER PLANTS

Base-Load. Stanton Base-Load Plant Burning Anthracite Culm. Power, vol. 66, no. 9, Aug. 30, 1927, pp. 312–317, 7 figs. Initial two-unit installation of station designed for eight units and capacity of 360,000 kw., arranged four units on side into two identical plants physically interconnected for emergency interchange of service; burning of anthracite culm on forced-draft chain grates is facilitated by use of two combustion chambers separated by a 3-ft. throat in which opposing blast nozzles introduce air preheated to 500 deg.; for introduction under stoker air is tempered to 350 deg. by an air-water economizer; steam is bled at three points, two lines for heating the feed water and providing evaporator steam, and the third to supply the steam-jet air pumps; reheat boilers are used.

Economy in. Further Economy in Steam Generation, E. V. Ahara. Eng. Inst. of Canada—Jl., vol. 10, no. 8, Aug. 1927, pp. 386–389, 6 figs. Consideration of steam generating plants designed to burn pulverized coal and wood refuse. Paper read before the Sault Ste. Marie Branch of the Eng. Inst. of Canada, Feb. 25, 1926.

Live-Steam Reheater. Live-Steam Reheater for 90,000 Kw. Generating Unit at Crawford Avenue Plant. Power, vol. 66, no. 8, Aug. 23, 1927, pp. 288–290, 4 figs. High-pressure steam in coils to reheat turbine steam before it passes to low-pressure cylinder; will reheat 500,000 lb. per hour to 470 deg. fahr.; operation inherently automatic.

STEAM TURBINES

Ford. Ford Motor Company Designs and Builds Its Own Small Turbines. Power, vol. 66, no. 7, Aug. 16, 1927, pp. 232–235, 5 figs. For use in its various assembly plants Ford Motor Company has designed and constructed in its own shops number of turbine-generator units ranging in size from 75- to 5000-kw.; this article describes in detail design of the 5000-kw. unit and indicates main design features of some of smaller units.

Ljungström. Service Experience with Stal Turbine (Ein wirtschaftlicher Dampfantrieb), S. Bock. Schiffbau, vol. 28, no. 9, May 4, 1927, pp. 212–215, 1 fig. Results of 6 years' running experience with Ljungström or Stal turbine fitted to Danish merchant steamer, *Pacific;* main machinery consists of set of double-reduction turbines taking steam of 14 atmos. pressure from two Scotch boilers; reversing is accomplished by reversing gear disposed between first and second reduction stages; all auxiliaries are turbine driven. See translated abstract in Mar. Engr. & Motorship Bldr., vol. 50, no. 599, July 1927, p. 276.

Super-Pressure. 480-Kw. Super-Pressure Steam Turbo-Generator. Engineering, vol. 124, no. 3212, Aug. 5, 1927, pp. 164–165, 12 figs. Description of a 480-kw. steam turbine built for 100 atmos. and 400 deg. cent.; rotor speed 15,000 r.p.m.; generator, 3000 r.p.m., 3-phase, 50 cycles, 525 volts. Built by The Tktiebolaget de Lavals Angturbin, Stockholm.

Vibration of Blades. Calculation of Vibration Frequencies of Steam-Turbine Blades (Berechnung der Eigenfrequenzen von Dampfturbinenschaufeln), E. Jaquet. Schweizerische Bauzeitung, vol. 90, no. 1, July 2, 1927, pp. 1–3, 2 figs. Grapho-analytical method especially adapted for case of cylindrical blades with shrouding or other single mass at free end; gives curves for quick determination of fundamental and superimposed (overtone) vibrations.

STEEL

Ball Bearings. Steel for Ball Races. Metallurgist (Supp. to Engineer), June 24, 1927, p. 83. Review of paper by Houdremont and Kallen, published in V.D.I. Zeit., July 31, 1926, on preparation and properties of ball-bearing steels; basic electric furnace is to be preferred to basic open-hearth, but it is preferable to work with pure scrap or Swedish charcoal iron; whole process resolves itself into melting charge and adding alloy constituents, either in acid or basic open-hearth or electric furnaces; addition of chromium to steel causes marked increase of hardness and elastic limit.

High-Speed. See STEEL, HIGH-SPEED.

Manganese. See MANGANESE STEEL.

Molten, Gas Content of. New Process for Determination of Gas Content of Molten Metal (Ein neues Verfahren zur Bestimmung des Gasgehaltes von flüssigen Metallschmelzen), A. Wüster and E. Piwowarsky. Stahl u. Eisen, vol. 47, no. 17, Apr. 28, 1927, pp. 698–702, 5 figs. Method of determining gas contained in known volume of molten iron or steel intended primarily for work on small laboratory scale; method consists in sucking molten metal into previously evacuated chill mold, gases evolved during solidification being collected in evacuated glass apparatus connected with mold. See also review of above article in Metallurgist (Supp. to Engineer), June 24, 1927, p. 87.

Nickel. See NICKEL STEEL.

Repeated Stresses, Effect of. Changes in Microstructure of Structural Steels Caused by Repeated Stresses (Die Veränderungim Kleingefügeverschiedener Baustähle durch Wechselbeanspruchung), W. Herold. V.D.I. Zeit., vol. 71, no. 29, July 16, 1927, pp. 1029–1032, 24 figs. Microphotographs of structure of manganese and chrome-nickel steels before and after stressing, some of them showing crystallization, fatigue cracks, etc.; results of tests discussed.

STEEL CASTINGS

Large, Manufacture of. Manufacture of a Large Steel Casting (La fabrication d'une grande piece en acier coulé), F. A. Melmoth and T. H. Brown. Revue de Fonderie Moderne, vol. 21, July 25, 1927, pp. 221–231, 12 figs. Also translation in Foundry Trade Jl., vol. 36, nos. 568 and 569, July 7 and 14, 1927, pp. 19–22 and 45–48, 12 figs. Full description of process of casting support of propeller shaft, from first tests of casting, critical discussion of used metallurgical and molding methods and their alternatives.

Steam Cylinders and Piston Rings. Note on the Manufacture of Steam Cylinders for Locomotives and Piston Rings by the Paris-Orléans Railway Company, L. Audo. Foundry Trade Jl., vol. 36, no. 568, July 7, 1927, pp. 7–14, 11 figs. Notes on melting, manufacture; machining rings and boring cylinders; sand preparation; making of mold; annealing; welding.

STEEL, HEAT TREATMENT OF

Electric Installation. Electric Heat Treating Installation. Forging—Stamping—Heat Treating, vol. 13, no. 6, June 1927, p. 241. In plant burning natural gas substitution of electricity affected reduction both in cost of operation and in refections; temperature control more positive.

Quenching. A Practical Course in the Elements of Physical Metallurgy. Forging—Stamping—Heat Treating, vol. 13, no. 6, June 1927, pp. 237–240. Quenching; classification of quenching mediums; pyrometers.

Rate of Cooling. Influence of Rate of Cooling on the Structure of Alloys (Uber den Einfluss der Abkühlungsgeschwindigkeit auf die Struktur der Legierungen), A. A. Botschwar. Zeit. für anorganische u. allegemeine Chemie, vol. 134, no. 1–3, July 26, 1927, pp. 189–194, 1 fig. A metallographic study of steels containing carbon, manganese, silicon, sulphur and phosphorus.

STEEL, HIGH-SPEED

Cutting Tools. Heat Treating Is Critical Operation in Making Cutters and Tools, F. W. England. Iron Trade Rev., vol. 81, no. 5, Aug. 4, 1927, pp. 251–253, 4 figs. Describes high-speed-steel hardening furnaces in plant of Illinois Tool Works, Inc.; laboratories equipped for chemical, metallurgical, microscopic, and screen projection tests.

STEEL MANUFACTURE

Basic Open-Hearth. Making Basic Open-Hearth Steel, C. W. Veach. Blast Furnace & Steel Plant, vol. 15, no. 7, July 1927, pp. 323–325. Discusses

several features such as furnace construction, operation, charging and heat control.

STEEL WORKS

Timken Roller Bearing Co. New Steel Plant of the Timken Company. Blast Furnace & Steel Plant, vol. 15, no. 7, July 1927, pp. 317–318, 4 figs. Steel melted in both electric and open-hearth furnaces; charging machine and ladle crane of improved design; plant arranged for economical operation.

STRESSES

Graphical Analysis. A Graphical Analysis of Stress, H. W. Swift. Engineer, vol. 144, no. 3737, Aug. 26, 1927, pp. 226–228, 27 figs. Establishes graphical construction of modified Mohr diagram by new method and gives some application to which it lends itself with advantage.

SUBWAYS

Rolling Stock. New Rolling Stock for the London Underground Railways. Ry. Engr., vol. 48, no. 570, July 1927, pp. 263–269, and 275, 6 figs. Construction details of motor and trailer cars used on the Edgware to Morden lines.

SUPERHEATERS

Design. Modern Superheating. Power Engr., vol. 22, no. 256, July 1927, pp. 259–260. Position of superheaters; types of superheater elements; element joints; water-tube protection for walls; superheaters for pulverized fuel.

SURGE TANKS

Design. An Economic Surge-Tank Design (Eine wirtschaftliche Wasserschlossform), J. Schüller. Schweizerische Bauzeitung, vol. 89, no. 25, June 18, 1927, pp. 329–331, 1 fig. Original design based on differential-action principle, combined with advantages of shaft type of design, inlet submerged, flap valve at highest operating level, results in economy in space and better energy balance.

T

TAPS

Design and Construction. Design and Construction of Taps, A. L. Valentine. Machy. (London), vol. 30, no. 771, July 21, 1927, pp. 489–493, 5 figs. With special reference to taps having ground threads; fourth of series of articles.

TERMINALS, BUS

Location. City Terminals for Suburban Buses, W. Tufts. Bus Transportation, vol. 6, no. 8, Aug. 1927, pp. 441–444. Factors determining location are (1) The directional origin and relative quantity of present and future intercity buses; (2) areas within city through which buses will not be able to operate permanently; (3) relative need for terminals in various possible locations; (4) working out of an enduring balance between first three factors.

TEST CODES

Low-Pressure Heating Boilers. What's Wrong with This Code? Heating & Ventilating Mag., vol. 24, no. 8, Aug. 1927, pp. 79–82. Basis proposed by A.S.H.&V.E. for rating low-pressure heating boilers.

TEXTILE MACHINERY

Garnet Roller. Garnet-Roller of Unique Design, D. M. Duncan. Can. Machy., vol. 38, no. 2, July 14, 1927, pp. 17–18, 3 figs. Describes construction of garnet-roller as example of device which may have application in other spheres than textile industry from its unusually practical nature.

Looms. Development of Looms (Ueberblick über die bauliche Entwicklung der Webemaschinen), R. Rossmann. V.D.I. Zeit., vol. 71, no. 28, July 9, 1927, pp. 973–977, 16 figs. Based on two main movements, author discusses different construction possibilities and their important characteristics; account of attempts to make looms automatic; present status of developments.

TEXTILES

Rayon. Recent Developments in the Manufacture and Process of Rayon and Rayon Goods, F. W. Sturtevant. Textile World, vol. 72, no. 7, Aug. 13, 1927, pp. 38 and 43. Altering dyeing affinity of viscose; revised yarn table; basic colors on cellulose acetate.

THERMODYNAMICS

Cooling Effects, Measurement of. A New Arrangement for Measuring Cooling Effects (Eine neue Schaltung zur Messung des Abkühlungseffektes), H. Rothe. Zeit. für Physik, vol. 41, no. 6–7, Feb. 21, 1927, pp. 530–534, 1 fig. New arrangement with which it is possible to determine with greater accuracy than hitherto exchange of heat which takes place owing to thermic emission of charged particles; cause of abnormal cooling effects previously observed by author in space-charge region with oxide cathode is explained.

Heat Engines, Theory of. Heat Engines according to New Thermodynamic Principles (Wärmemotoren nach neuen thermodynamischen Grundsätzen), R. Dallwitz-Wegner. Wärme, vol. 50, no. 3, Jan. 21, 1927, pp. 33–39, 4 figs. General theoretical discussion of thermodynamics of heat engines, showing that heat energy can be utilized in cyclic processes just as electrical or potential energy and with materially the same efficiency; also demonstrates possibility of heat engines requiring no expenditure of fuel, and that second law of thermodynamics is not a natural law.

TIDAL POWER

Plants. Application of Thury Distribution System by Direct Current with Constant Intensity in the Scheme for a Tidal Power Plant at Frenaye, France [L'application du système de distribution Thury par courant continu à intensité constante au project d'usine marémotrice de la Frenaye (Cotes-du-Nord)], L. Schwob. Génie Civil, vol. 90, no. 21, May 21, 1927, pp. 500–504, 6 figs. Problem of utilization of tides, hitherto only theoretically treated, will be realized in construction of tidal electric plant; estimated cost, 630 million francs; dam with storage capacity of 20 million sq. m. of water at average height of 35 m. above bay level.

TIME STUDY

Standardization. The Value of Training and Standardization to Time Study Engineering, W. Hasselhorn. Soc. Indus. Engrs.—Bul., vol. 9, no. 3, Mar. 1927, pp. 7–9. Training of time-study engineers. Address delivered at meeting of Chicago Chapter, Feb. 24, 1927.

Standardized Calculation. Time Standardization (Ueber die Grundlagen vergleichender Zeitkalkulationen), H. D. Brasch. Maschinenbau, vol. 6, no. 10, May 19, 1927, pp. 489–496, 13 figs. Comparative studies on time in various plants are hampered and confused; as first step toward generalization of national efficiency it should therefore be insisted that basic time everywhere should be counted and tabulated in same way; comparative time studies of accomplishments after necessary corrections have been made show enormous variation and indicate that such studies could be made highly profitable to nation. See brief translated abstract in Automotive Abstracts, vol. 5, no. 7, July 20, 1927, p. 219.

TIRES, RUBBER

Relation of Road Type to Wear. Relation of Road Type to Tire Wear, O. L. Waller and H. E. Phelps. Am. Soc. of Civil Engrs.—Proc., vol. 53, no. 6, Aug. 1927, pp. 1189–1206, 1 fig. Study of wear of automobile tires to determine destructive effect of different types of road surfaces on tread rubber in order that, as far as possible, surfaces may be so improved as to make cost of building and maintaining road surfaces and of operating traffic over them a minimum.

TRAFFIC

Control. New York State Committee Urges Use of Standard Traffic Signals. Bus Transportation, vol. 6, no. 8, Aug. 1927, pp. 426–428, 4 figs. Simple, fundamental rules urged as a basis for relieving present unfortunate situation resulting from lack of uniformity in meaning of signal lights by a New York committee which carefully studied the question. See also Good Roads, vol. 70, no. 7, July 1927, pp. 311–317, 6 figs.

V

VALVES

High-Pressure Stop. Mason's High-Pressure Stop Valve. Engineering, vol. 124, no. 3208, July 8, 1927, p. 60, 4 figs. Suitable for continuous service with steam with higher temperatures and pressures in use.

VENTILATION

Errors in System Design. Some Common Errors in the Design of Ventilating Systems and Fan Application, A. Hindley. Domestic Eng., vol. 47, no. 6, June 1927, pp. 113–115, 4 figs. Figures given are in most cases result of practical experience and test, and when used in design or alteration of subsequent installations have proved sufficiently correct for all practical purposes.

Industrial. Industrial Ventilation with Particular Reference to Hot and Dusty Trades, C. P. Yaglou. Fuels & Furnaces, vol. 5, no. 8, Aug. 1927, pp. 977–985, 7 figs. Industrial dusts, fumes, and vapors; their physiologic effects; their removal from air; temperature, humidity, and air movement; effective temperature; influence of hot environments on output; seasonal variation in output; accidents, sickness, and mortality in relation to temperature; acclimatization to high temperature and adaptation to muscular exercise; effects of profuse perspiration; influence of air movement and of clothing on output; problem of ventilating hot industries.

VIBRATIONS

Mechanical, Measurement of. Measurement of Mechanical Vibrations (Messung mechanischer Schwingungen), W. Knichahn. V.D.I. Zeit., vol. 71, no. 28, July 9, 1927, pp. 997–999, 11 figs. Advantages of optical methods; possibilities of practical application; application to torsional oscillations.

W

WAGES

Piece-Time Rate. A New Form of Piece-Time Rate Calculation (Eine neue Form des Zeitakkordes), W. Keil. Maschinenbau, vol. 6, no. 9, May 5, 1927, pp. 461–463. Commends system for its generality and wide range of application; illustrates its operation in wire-cable plant.

Rowan Plan, Italy. The Premium System of Wages in the Rolling-Stock Repair Shops of the Italian State Railways (Il sistema di lavorazione con premio di maggiore produzione nelle Officiene di grande riparazione del materiale rotabile), L. Saccomani. Rivista Tecnica delle Ferrovie Italiane, vol. 31, no. 6, June 15, 1927, pp. 237–271. Data on successful operation of Rowan plan in large repair shops of Turin, Verona, etc.; theory and mathematics of system, forms of reports, etc.

WATER SOFTENING

System, Selection of. Choosing a Water Softening System, H. M. Marsh. Power House, vol. 21, no. 14, July 20, 1927, pp. 19–20, 2 figs. Precautions that should be taken in choosing a zeolite water-softening system, design, material, and workmanship all having a bearing on satisfactory operation.

WATER TREATMENT

Railways. Progress of Water Treatment on Railroads, R. E. Coughlan. Am. Water Wks. Assn. —Jl., vol. 18, no. 1, July 1927, pp. 55–59. Western railroads, due to poor quality of water available in their territories, have taken initiative in installation of water-treating facilities, and it is on western railroads that most marked improvement has been noticed; water treatment of Chicago and North Western; pitting of flues and boiler corrosion.

WATER WORKS

Pumping Plants. Increasing Efficiency of Pumping Plants, F. Johnstone-Taylor. Water Works Eng., vol. 80, no. 15, July 20, 1927, pp. 1061–1062 and 1100, 2 figs. How best to determine efficiency of water works pumping plant and methods calculated to increase its usefulness.

WAVE POWER

Utilization. Wave Power, L. Smith. Mech. Eng., vol. 49, no. 9, Sept. 1927, pp. 995–998, 2 figs. Description of a machine which is claimed to meet essential requirements and for which the author predicts an efficiency of 60 per cent.

WELDING

Autogenous. See AUTOGENOUS WELDING.

Automobile Body Panels. Body Panels Welded from Small Punchings Economically. Automotive Mfr., vol. 49, no. 4, July 1927, p. 8. Pierce-Arrow engineer describes advantages of that company's method of avoiding use of deep drawings, stretched material, expensive tools and dies.

Electric. See ELECTRIC WELDING, ARC.

Large Machine Parts. Arc Welding Eliminates Casting in A.-C. Machines, E. S. Henningsen and A. P. Wood. Elec. Wld., vol. 90, no. 6, Aug. 6, 1927, pp. 257–259, 8 figs. Designers are endeavoring to eliminate castings wherever possible in alternating-current generators and motors and to substitute rolled-steel plate and structural steel fabricated by arc welding or bolting.

Machine Frames. Building Large Machine Frames in One Piece by Welding, R. E. Kinkead. Am. Mach., vol. 67, no. 7, Aug. 18, 1927, pp. 259–260, 2 figs. Substitution of welded steel for cast-iron frames.

Management of. Preparing, Supervising, and Testing of Welding Work (Die Vorbereitung, Ueberwachung und Prüfung der Schweissarbeiten bei der Schmelzschweissung), D. Bardtke. Maschinenbau, vol. 6, no. 11, June 2, 1927, pp. 541–548, 25 figs. Modern methods of welding and testing of welds and role of engineer in managing work.

Water-Gas. Construction of Steel Tanks by Water-Gas Welding (Behälterbau aus Eisenblech mittels Wassergasschweissung), E. Pohl. Centralblatt der Hütten u. Walzwerke, vol. 31, no. 4, Jan. 26, 1927, pp. 35–36, 4 figs. Process requiring water-gas torches on inner and outer sides of plate, suited for welding of thickest plates and guaranteeing weld strength 90 per cent of plate strength.

WIRE DRAWING

Steel. The Relation of Steel Quality to the Drawing of Steel Wire, E. A. Atkins. Wire, vol. 2, no. 7, July 1927, pp. 226–229 and 252, 22 figs. Segregated steel; surface defects and hollowness; effect of non-metallic inclusions; cause of wire "running out" or not sizing correctly; nature of hard inclusions.

WOOD PRESERVATION

A.R.E.A. Report on. Report of Committee XVII —Wood Preservation, F. C. Shepherd. Am. Ry. Eng. Assn.—Bul., vol. 28, no. 295, Mar. 1927, p. 1113. Revision of manual; service test records; preservative treatment of trunking and capping; marine piling investigations; treatment with creosote and petroleum; treatment with zinc chloride and petroleum; preparation of structural material before treatment; report on effect of steaming on wood; outline of work for ensuing year.

Impregnation. Wood Impregnation (Einige Beobachtungen der Imprägnierungstechnik über die Fortleitung von Flüssigkeiten im Holz), F. Moll. Zeit. für angewandte Chemie, vol. 40, no. 21, May 26, 1927, pp. 583–585. Most practical and uniform results in wood impregnation are obtained by pressure impregnation in closed cylinders or by prolonged soaking in open tanks; methods depending on osmosis, dialysis, electricity and the like, have not yet shown themselves to be equal to older processes; methods of improving penetration.

WOODWORKING PLANTS

Waste Disposal. Refuse Wood in Indiana Plant Handled and Fired Mechanically. Power Plant Eng., vol. 31, no. 16, Aug. 15, 1927, pp. 873–875, 6 figs. On account of its reliability, steadiness, and ease of operation, fuel-handling system installed in heating plant of kitchen-cabinet manufacturing factory of the G. I. Sellers & Sons Company, at Elwood, Ind., is outstanding example of progress made in art of refuse wood-handling and burning.

THE ENGINEERING INDEX

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Mechanical Engineering Section

THE ENGINEERING INDEX presents each month, in conveniently classified form, items descriptive of the articles appearing in the current issues of the world's engineering and scientific press of particular interest to mechanical engineers. At the end of the year the monthly installments are combined along with items dealing with civil, electrical, mining and other branches of engineering, and published in book form, this annual volume having regularly appeared since 1906. In the preparation of the Index by the engineering staff of The American Society of Mechanical Engineers some 1200 technical publications received by the Engineering Societies Library (New York) are regularly reviewed, thus bringing the great resources of that library to the entire engineering profession.

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AERODYNAMICS

Drag of Wings. Drag of Wings with End Plates, P. E. Hemke. Nat. Advisory Committee for Aeronautics—Reports, no. 267, 1927, 13 pp., 12 figs. The reduction of induced drag, when end plates are used, is sufficiently large to increase efficiency of wing; curves showing reduction of drag for monoplanes and biplanes are constructed; influence of gap-chord ratio, aspect ratio, and height of end plate are determined for typical cases; method of obtaining reduction of drag for multiplane is described; comparisons are made of calculated and experimental results obtained in wind-tunnel tests with airfoils of various aspect ratios and end plates of various sizes; agreement between calculated and experimental results is good; analysis of experimental results shows that shape and section of end plates are important.

AERONAUTICS

Airplane Stations. An Aeroplane Station In Mid-Atlantic, W. Hovgaard. Engineering, vol. 124, no. 3214, Aug. 19, 1927, pp. 223–224, 2 figs. Proposes the establishment at Faraday Hills of a specially designed ship with a 1000-ft. flying deck and various conveniences.

History. Invention, Transportation, The Flying Machine. Oil-Power, vol. 2, no. 7, Aug. 1927, pp. 99–110, 33 figs. A résumé of some early conceptions of flying machines; development of balloons; gliders; Langley's work; the Wright Bros.

Taking-Off with Heavy Loads. A Warning Concerning the Take-Off with Heavy Load, E. G. Reid and T. Carrol. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 258, July 1927, 6 pp., 2 figs. Notes on disasters due to taking-off with heavy loads.

AIR COMPRESSORS

Centrifugal. Centrifugal Compressors, B. L. Spain. Iron & Steel Engr., vol. 4, no. 8, Aug. 1927, pp. 363–368, 10 figs. Some of interesting problems encountered in the development of the centrifugal compressor or blower; contribution of producers of steel and other materials to development of art; steel-mill applications; available drivers; auxiliary features; other interesting applications; future developments.

Turbo-Compressors. Recent Turbo-Compressors and Turbo-Blowers (Neuere Kreiselverdichter), E. A. Kraft. Centralblatt der Hütten u. Walzwerke, vol. 31, no. 31, Aug. 3, 1927, pp. 423–432, 20 figs. Recent German practice in design and construction of turbo-compressors (30,000 cu. m. per hr., 7 atmospheres, 4400 r.p.m.) and turbo-blowers (65,000 cu. m. per hr., 1.85 atmospheres, 2700 r.p.m.); discusses cooling and oiling systems, regulation, construction of casings, etc.

AIR CONDITIONING

Filters. Code for Testing Air Filters. Am. Soc. of Heat. & Vent. Engrs.—Jl., vol. 33, no. 8, Aug. 1927, pp. 519–521. Preliminary draft of code.

Temperature, Humidity and Air Motion. Report of Technical Advisory Committee on Temperature, Humidity and Air Motion, W. H. Carrier. Am. Soc. of Heat. & Vent. Engrs.—Jl., vol. 33, no. 8, Aug. 1927, pp. 521–522.

AIRPLANE ENGINES

Bristol Jupiter. The Bristol "Jupiter" Series VI Engine. Aviation, vol. 23, no. 11, Sept. 12, 1927, pp. 599–602. Three models of English engine differ only in compression ratio and ignition installation and are now being used all over world.

Carburetor Air Heaters. Carburetor Air Heater, P. B. Taylor. Aviation, vol. 23, no. 7, Aug. 15, 1927, p. 370, 2 figs. A development to eliminate carburetor operation difficulties.

Fairchild-Caminez. Fairchild Caminez Engine Now in Production, D. B. Caminez. Aviation, vol. 23, no. 11, Sept. 12, 1927, pp. 591–594. Fairchild Caminez engine is 4-cylinder, stationary radial air-cooled engine, using cam type drive and is characterized by its high power output at low propeller speed, its efficiency, and simplicity of its construction.

Inverse Cylinder. The Inverse Farman Motor (Le Farman inverse 500–700 HP). L'Aeronautique, no. 98, July 1927, pp. 218–221, 14 figs. Details of new Farman 18W-1, with 18 inverted cylinders, 550 hp., 2800 r.p.m., weighing 318 kg.

Italian. Italian Aircraft Engines. Automobile Engr., vol. 17, no. 231, Aug. 1927, pp. 280–292, 32 figs. Description of Isotta-Fraschini "Asso," the Cappa "18," the Fiat "A20" and "AS2" aircraft engines.

Wright Whirlwind. Wright Whirlwind Engine Production, L. M. Beatty. Aviation, vol. 23, no. 13, Sept. 26, 1927, pp. 727–732 and 767, 11 figs. Describes in detail manufacture of Wright Whirlwind engines; paper presented at meeting of Soc. of Automotive Engrs., Cleveland, Ohio, Sept. 19, 1927.

AIRPLANES

Bombers. The Keystone All-Metal Bomber. Aviation, vol. 23, no. 11, Sept. 12, 1927, pp. 595–597. Super cyclops, which is third of series built for army under five-year program has crew of five and is powered by two-geared Packard 1500 (550 hp.) engines.

Bristol Fighter. A New Bristol Fighter-Type 101. Flight, vol. 19, no. 34, Aug. 25, 1927, pp. 589–590, 1 fig. "Fighter 101" is high performance two-seater fuselage tractor biplane fitted with Bristol "Jupiter VI" engine; wings and center sections are constructed entirely of metal, while fuselage is an exceptionally rigid structure of spruce reinforced with plywood; other important features.

Commercial. Airplanes for Commercial Aviation, A. H. G. Fokker. Soc. of Automotive Engrs.—Jl., vol. 21, no. 3, Sept. 1927, pp. 250–253, 3 figs. Safety of operation; airplanes must not be overloaded; cantilever wings of wood; use of brakes on airplane wheels; single- vs. multiple-engine airplanes.

Copenhagen Aero Show. Danish Aero Show. Times Trade & Eng. Supp., vol. 20, no. 476, Aug. 20, 1927, p. 529, 1 fig. British radial engines and new Bristol fighter.

The Copenhagen Aero Show, E. Hildesheim. Aeroplane, vol. 33, no. 8, Aug. 24, 1927, pp. 268–272, 4 figs. Description of airplanes and airplane engines exhibited at the Third European International Aero Show.

Dole Derby. Descriptions of the Dole Derby Planes. Aviation, vol. 23, no. 8, Aug. 22, 1927, pp. 414–417, 8 figs. Majority of entries are monoplanes with landing gears and are powered with single Wright Whirlwind engines.

Fairchild. The Fairchild Cabin Monoplane. Aviation, vol. 23, no. 7, Aug. 15, 1927, pp. 362–364, 4 figs. Designed for varied classes of activity, has folding wings and is powered by a Wright Whirlwind or Curtiss C-6 engine.

Flying Boats. See FLYING BOATS.

Ford Tour. On Another Lesson from America. Aeroplane, vol. 33, no. 7, Aug. 17, 1927, pp. 225–236, 11 figs. Illustrated description of some of the airplanes taking part in the Ford Tour.

Lockheed "Vega." The Lockheed "Vega" Commercial Plane. Aviation, vol. 23, no. 8, Aug. 22, 1927, pp. 420–421, 2 figs. High lift wing monoplane with monocoque fuselage, no external bracing and powered with a single Wright Whirlwind engine.

Naval. Modern Naval Aircraft, L. B. Richardson. Soc. of Automotive Engrs.—Jl., vol. 21, no. 3, Sept. 1927, pp. 245–249, 4 figs. Requirements of various types; structural elements; all-metal plane yet to come; corrosion a great problem; five classes of plane required; amphibian and convertible planes; power-plant accessories; reducing resistance; need for power controls and adjustable and reversible propellers; future developments.

Pitcairn Mailwing. The Pitcairn Mailwing. Aviation, vol. 23, no. 10, Sept. 5, 1927, pp. 533–535, 4 figs. A high performance mail and express carrying plane designed around the Wright Whirlwind engine and equipped for overnight service.

Pontoons for. Quantity Production of Fairchild Pontoons, A. Black. Aviation, vol. 23, no. 10, Sept. 5, 1927, pp. 526–529, 6 figs. Describes pontoons to be produced in quantity by Fairchild Aviation Corpn.; metal pontoon built on wood and metal framework; nose of pontoon is separate unit; pontoons are absolutely watertight.

Rotating. "Rotating Plane" Designed for Safe Landing in Case of Failure, E. P. A. Heinze. Automotive Industries, vol. 57, no. 7, Aug. 13, 1927, p. 227, 1 fig. Gyroscope rotating in horizontal plane insures stability of machine while in air and enables operator to glide down; car weighs slightly over 800 lb.

Schneider Contest, 1927. The 1927 Schneider Trophy Contest. Flight, vol. 19, no. 33, Aug. 18, 1927, pp. 576–578, 4 figs. Some notes on the "Crusader" and the race itself.

Seaplanes. See SEAPLANES.

Sikorsky. The "Ville de Paris." Aviation, vol. 23, no. 13, Sept. 26, 1927, pp. 718–722, 8 figs. New Sikorsky plane, model S-37, built for Rene Fonck, is an all-metal sesquiplane of openwork construction and is powered with two Gnome Rhone Jupiter 500-hp. engines.

Stinson-Detroiter Monoplane. The Stinson-Detroiter Monoplane. Aviation, vol. 23, no. 12, Sept. 19, 1927, pp. 666–667, 3 figs. Powered by single Wright whirlwind engine and with exception of fabric and wing spars it is constructed entirely of metal.

Spirit of St. Louis. Technical Preparation of the Airplane "Spirit of St. Louis," D. A. Hall. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 257, July 1927, 12 pp., 25 figs. An effort to clarify the current impressions as to the technical preparation, in connection with both design and performance, of the airplane used by Col. Charles A. Lindbergh.

Wings. Numerical Design of Longitudinal Spars of Airplane Wings (Calcul d'un longeron d'aile), F. Orain. L'Aeronautique, no. 98, July 1927, pp. 223–225, 9 figs. Criticizes assumptions generally made for

NOTE.—The abbreviations used in indexing are as follows:

Academy (Acad.)	Engineer (Engr.[s])	Machinery (Machy.)	Record (Rec.)
American (Am.)	Engineering (Eng.)	Machinist (Mach.)	Refrigerating (Refrig.)
Associated (Assoc.)	Gazette (Gaz.)	Magazine (Mag.)	Review (Rev.)
Association (Assn.)	General (Gen.)	Marine (Mar.)	Railway (Ry.)
Bulletin (Bul.)	Geological (Geol.)	Materials (Matls.)	Scientific or Science (Sci.)
Bureau (Bur.)	Heating (Heat.)	Mechanical (Mech.)	Society (Soc.)
Canadian (Can.)	Industrial (Indus.)	Metallurgical (Met.)	State names (Ill., Minn., etc.)
Chemical or Chemistry (Chem.)	Institute (Inst.)	Mining (Min.)	Supplement (Supp.)
Electrical or Electric (Elec.)	Institution (Instn.)	Municipal (Mun.)	Transactions (Trans.)
Electrician (Elecn.)	International (Int.)	National (Nat.)	United States (U. S.)
	Journal (Jl.)	New England (N. E.)	Ventilating (Vent.)
	London (Lond.)	Proceedings (Proc.)	Western (West.)

sake of simplicity and offers original mathematical analysis based on realistic data as to distribution of loads, form of cross-section, etc.

ALLOY STEELS

Copper Steel. Corrosion Resistance of Copper Steel. Metallurgist (Supp. to Engr.), Aug. 1927, pp. 121–123, 2 figs. From an article by Dr. Daeves, in Stahl u. Eisen, no. 52, 1927, p. 1857.

High Copper in Steel Produces Poor Product. Iron Age, vol. 120, no. 8, Aug. 25, 1927, p. 468. German steel made from copper-bearing pig irons; sheet steel from this iron less amenable to dishing; surface is rough.

Deterioration. Deterioration of Alloy Steels in Ammonia Synthesis, J. S. Vanick. Chem. & Met. Eng., vol. 34, no. 8, Aug. 1927, pp. 489–492, 3 figs. Deterioration during the synthesis of ammonia of materials which originally possessed the requisite physical properties.

ALLOYS

Aluminum. See ALUMINUM ALLOYS.
Brass. See BRASS.
Bronzes. See BRONZES.
Copper. See COPPER ALLOYS.
Iron. See IRON ALLOYS.

ALUMINUM ALLOYS

"Alclad." "Alclad" A New Corrosion Resistant Aluminum Product, E. H. Dix. Nat. Advisory Committee For Aeronautics—Tech. Notes, no. 259, Aug. 1927, 13 pp., 13 figs. A new corrosion resistant aluminum product which is markedly superior to present strong alloys; its use should result in greatly inc eased life of structural part; product, designated "Alclad," has been in course of development by the Research and Technical Departments of the Aluminum Company of America for some time.

Aluminum Bronze. Aluminum Bronze, J. Strauss. Am. Soc. for Steel Treat.—Trans., vol. 12, no. 2, Aug. 1927, pp. 239–273 and (discussion) 273–278 and 306, 8 figs. Present paper is a review of constitution, mechanical properties and resistance to corrosion of these aluminum-copper alloys with and without addition of other elements; it is intended to provide those who up to present time have been largely interested in steel and its heat treatment, with a survey of a portion of the non-ferrous field in which mechanical properties, heat treatment practice and other features are closely allied to those of some common ferrous products.

Duralumin. See DURALUMIN.

KS-Seewasser. The KS-Seewasser Alloy (Die Legierung "KS-Seewasser"), R. Sterner-Rainer. Zeit. für Metallkunde, vol. 19, no. 7, July 1927, pp. 282–284, 7 figs. Properties of an alloy made of 94% aluminum, 3% manganese, 0.50% of magnesium.

AMMONIA COMPRESSORS

Improvements. Ammonia Compressor and Valve Improvements. Power Plant Eng., vol. 31, no. 15, Aug. 1, 1927, pp. 838–839. Factors responsible for economy in compressors; relative merits of different types of valves discussed at meeting of the N.A.P.R.E. in New York.

APPRENTICES, TRAINING OF

California. How High Schools and California Industries Work Together. West. Machy. World, vol. 18, no. 8, Aug. 1927, pp. 375–377, 2 figs. Coöperative course recently installed in a Southern high school.

Development. Am. Foundrymen's Assn.—Advance Paper, no. 27-22, June 6–10, 1927, 35 pp. Group of seven papers presented before Am. Foundrymen's Assn., in June 1927, dealing with apprenticeship as a labor stabilizer, making apprenticeship pay dividends, publicity program, reducing apprentice turnover, coöperation in apprenticeship, and apprentice training in Milwaukee and Pittsburgh.

AUTOMOBILE ENGINES

Detonation. Detonation, A. W. Whatmough. Automobile Engr., vol. 17, nos. 230 and 231, July and Aug. 1927, pp. 260–263, 14 figs., and 306–311, 21 figs. Radiation of energy explained. Influence of engine design.

Dual Engines. Dual Engines, W. F. Bradley. Autocar, vol. 59, no. 1658, Aug. 12, 1927, pp. 297–298, 5 figs. Interesting development in multi-cylinder engine design being tried by Fiat and Bugatti racing departments.

Fuels. See AUTOMOTIVE FUELS.

Lubrication. Engine-Cylinder Lubrication, L. T. Wagner. Soc. of Automotive Engrs.—Jl., vol. 21, no. 3, Sept. 1927, pp. 311–314. Comparisons are made between splash-feed and force-feed systems of lubrication, primary purpose being to suggest means for securing the best possible results from equipment already in use through promoting a better understanding of the variables in engine operation that affect cylinder lubrication directly; variables analyzed are: viscosity of lubricating oil, solid impurities accumulating inside engine, volatility of fuel, cylinder temperatures, engine-speed, intake-manifold depression and mechanical condition.

Regrinding Cylinders and Crankshafts. Reground Auto Motors Show High Efficiency. Abrasive Industry, vol. 8, no. 9, Sept. 1927, pp. 282–284, 6 figs. Methods used in regrinding cylinders and crankshafts.

Trucks. Six-Cylinder Engines for Trucks, E. Favary. Soc. of Automotive Engrs.—Jl., vol. 21, no. 3, Sept. 1927, pp. 239–242, 3 figs. Advantages are: 50 per cent more power-strokes per revolution of the crankshaft than in the four-cylinder engine; overlapping of power-strokes, which gives more constant driving-torque and decreases intensity of vibrations; greater power obtainable, with corresponding decrease in weight of reciprocating parts; quicker acceleration, due to foregoing; and ability to run at high speed without laboring.

AUTOMOBILES

Air Brakes. The Automotive Air Brake, H. D. Hukill. Ry. Age, vol. 83, no. 9, Aug. 27, 1927, pp. 411–414, 5 figs. Discussion of the design and operation of air brakes for different types of automotive vehicles.

Arrol-Johnston. A Well-Found Scottish Car. Autocar, vol. 59, no. 1660, Aug. 26, 1927, pp. 371–373, 5 figs. Description of a 15–40-hp. car.

Bean. 4-Cylinder Bean Has Ricardo Head with Masked Inlet Valves, M. W. Bourdon. Automotive Industries, vol. 57, no. 13, Sept. 24, 1927, pp. 436–439, 9 figs. Dual induction tract from single carburetor, battery ignition, worm drive and quarter-elliptic rear springs are other features of new 14–40 hp. model.

Bodies. Fabric and Other Body Novelties. Automotive Mfr., vol. 69, no. 5, Aug. 1927, pp. 17–18, 1 fig. Modifications of Weymann body construction, wider use of linen and other fabrics, and changes in methods of body suspension; all trend to still lighter weight.

Modern Practices in Automobile-Body Designing, A. E. Northup. Soc. of Automotive Engrs.—Jl., vol. 21, no. 3, Sept. 1927, pp. 257–261, 4 figs. Fundamental dimensions that affect comfort; cheat lines used to accentuate length; artistry needed in outside design; treatment that enhances comfort.

Buick. The 25–75 H.P. Buick "Master Six," E. N. Duffield. Auto-Motor Jl., vol. 32, no. 33, Aug. 18, 1927, pp. 679–681, 5 figs. General description of "Master Six."

Bumpers. The Manufacture of Automobile Bumpers, C. H. Vivian. Forging—Stamping—Heat Treating, vol. 13, no. 8, Aug. 1927, pp. 297–299. To fulfil its purpose this accessory must endure rough service; methods of manufacture to secure this endurance are related; compressed air used in operations.

Chrysler. Chrysler "72" with Larger Engine Replaces Model "70." Automotive Industries, vol. 87, no. 8, Aug. 20, 1927, pp. 260–262, 5 figs. Piston displacement increased from 218 to 248 cu. in.; new power plant develops 75 b.hp.; bodies are lengthened.

Delage. The Six-Cylindered Delage. Auto-Motor Jl., vol. 32, no. 34, Aug. 25, 1927, pp. 705–708, 9 figs. A fine "six" of moderate power; good body accomodation; an interesting power plant; low loading; efficient braking.

Frames. Frame Design. Autocar, vol. 59, no. 1660, Aug. 26, 1927, pp. 374–376, 7 figs. Notes on automobile frames, with illustrations from American and foreign cars.

Gardner. Gardner Concentrating on Eights; Four Models in Line. Automotive Industries, vol. 87, no. 8, Aug. 20, 1927, p. 259, 1 fig. "75" and "85" are introduced to supplement two 8-cylinder models previously in production; Fedco system is adopted.

Headlight Adjustment. Head-Lamp Adjusting Mechanisms and Law Enforcement, W. W. Matthews. Soc. of Automotive Engrs.—Jl., vol. 21, no. 3, Sept. 1927, pp. 289–300, 8 figs. Double-filament incandescent lamps and head lamps as now designed, constructed, and distributed have not sufficiently justified themselves to public or to law-enforcement authorities, according to the author, to warrant their use without some restrictions to assure their performance in accordance with the claims made for them.

Paige. Paige 6–75 Fitted with Vibration Damper and New Manifold, A. F. Denham. Automotive Industries, vol. 57, no. 7, Aug. 13, 1927, pp. 220–221, 3 figs. Oil filter and rubber engine supports also added; compression ratio of 6–45 increased; air cleaner standard on eight-cylinder model; new color schemes are adopted.

Six-Wheel. The Suspension of Six-Wheelers. Automobile Engr., vol. 17, no. 231, Aug. 1927, pp. 299–302, 17 figs. A consideration of the working of various alternative arrangements.

Springs, Rubber Mountings for. Rubber Spring Mountings, W. C. Keyes. Automotive Mfr., vol. 69, no. 5, Aug. 1927, pp. 11–12, 1 fig. Natural advantages of resilient material now applied to road shock absorption; rubber for springs, steering gears, engines, etc.

Stabilators. Stabilator of Greater Sensitivity Designed for Light Cars, D. Blanchard. Automotive Industries, vol. 57, no. 10, Sept. 3, 1927, p. 347. New type AA spring-control device introduced by John Warren Watson Co. has smaller brake drums and higher coefficient of friction of brakeshoe material.

Vernon Special. The Vernon Special. Auto-Motor Jl., vol. 32, no. 32, Aug. 11, 1927, pp. 665–667, 9 figs. A new sports car of speed and comfort; supercharged engine; four-wheel brakes; fine mechanical details.

AUTOMOTIVE FUELS

Anti-Knock. Quantitative Antiknock Testing, C. K. Reiman. Indus. & Eng. Chem., vol. 19, no. 9, Sept. 1927, pp. 1055–1058, 1 fig. Method of measuring antiknock quality of motor fuels developed in laboratories of A. D. Little, Inc., where it has been in constant use for more than a year, is explained in detail; Dilco unit, after certain changes in field wiring, serves as dynamometer; speed, a very important factor in determining quantitative results, can be positively controlled electrically. Results are reported in percentage aniline added to a paraffin-base fuel serving as intermediate standard; this standard is provisionally placed on Edgar's absolute heptane-octane scale.

Carburetant, Benzol as a. Benzol and Its Use as a Carburetant (Le Benzol et son emploi comme carburant), M. Bihoreau. Jl. des Usines à Gaz, vol. 51, no. 15, Aug. 5, 1927, pp. 313–323. General review of carburetants of vegetal and mineral origin; properties and advantages of benzol and benzol mixtures with gasoline and alcohol; benzol production statistics for France and world.

Ethyl Alcohol. Ethyl Alcohol Makes Good Showing in French Fuel Tests. Automotive Industries, vol. 57, no. 9, Aug. 27, 1927, pp. 302–303. Starting of engine more difficult than with gasoline but in other respects results were up to standard; entrants divided into classes according to fuels used.

Gasoline. Gasoline—Past, Present and Future, A. L. Clayden. Soc. of Automotive Engrs.—Jl., vol. 21, no. 3, Sept. 1927, pp. 277–280, and (discussion) 280–285, 7 figs.

Kerosene. See KEROSENE.

Others Than Pure Gasoline. National Fuels Show of 1927 (Le rallye des "Carburants nationaux" de 1927), M. Raous. L'Industrie des Voies Ferrées et des Transports Automobiles, vol. 21, no. 248, Aug. 1927, pp. 362–369, 4 figs. Describes and discusses auto motors using fuels other than pure gasoline, also data on fuel value of alcohol, mixtures of alcohol and gasoline, heavy oils, various patented mixtures such as Cosmoline, Ketol, etc., and compressed producer or oil gases; considers results very satisfactory and promising to reduce fuel imports.

AVIATION

Airports. Location, Size and Layout of Airports, G. B. Ford. Am. City, vol. 37, no. 3, Sept. 1927, pp. 301–303. Factors to be considered in selecting airport site; types and location of hangars; auxiliary buildings.

Development in United States. Aviation in America, W. P. McCracken, Jr. Mun. & County Eng., vol. 72, no. 6, June 1927, pp. 284–291. Progress made in civil aviation; reliability of service; extent of air lines; air mail; increase of safety; financing of airports.

Germany. Traveling the Air in Germany, E. J. Mehren. Eng. News-Rec., vol. 99, no. 5, Aug. 4, 1927, pp. 172–174, 6 figs. General survey of aerial transportation in Germany; kinds of planes; fares, difficulties and future.

AXLES

Car, Fatigue Cracks in. A Study of Fatigue Cracks in Car Axles, H. Moore. Eng. Experiment Station—Univ. of Illinois Bul., vol. 24, no. 41, June 14, 1927, 22 pp., 9 figs. This study has been planned to secure an answer to following questions: can a fatigue crack in car axle be detected in the early stages of its development, so that axle may be removed from service before fatigue failure is imminent? If a fatigue crack has started in car axle under occasional high stress, will it spread under subsequent repetitions of ordinary working stress? If a fatigue crack has started in a car axle is it safe practice to turn down axle to a diameter smaller than that at bottom of crack, and then to continue axle in service under lighter loads? In this bulletin is a discussion of test results bearing on questions (1) and (2); experiments bearing on question (3) are in progress, but no definite conclusions have been reached as yet.

B

BALANCING MACHINES

Small Armatures. Dynamic Balancing Machine for Small Armatures. Engineering, vol. 124, no. 3213, Aug. 12, 1927, pp. 203–204, 7 figs. Machine constructed on Lawaczeck-Heymann system by Messrs. Carl Schenck, of Darmstadt.

BLAST-FURNACES

British Practice. British Blast-Furnace and Cupola Practice, J. E. Fletcher. Foundry Trade Jl., vol. 36, no. 18, Aug 18, 1927, pp. 153–154. Fuel economy in furnace and cupola; need to utilize maximum heat.

Practice. Effect of Relative Coarseness of Charge on Blast-Furnace Processes (Die Abhängigkeit der Vorgänge im Hochofen von der Stückgrösse der Beschickungsstoffe), Diepschiag. V.D.I. Zeit., vol. 71, no. 33, Aug. 13, 1927, pp. 1157–1163, 18 figs. Relation between nature of ore, volume of blast and dimensions of furnace; economic aspect of ore grinding; active reduction space of furnaces charged with coarse or with fine ore; equipment and modes of charging and charge distribution.

Reactions in. Iron Blast-Furnace Reactions, S. P. Kinney, P. H. Royster and T. L. Joseph. U. S. Department of Commerce—Bur. of Mines, no. 391, 1927, 65 pp., 34 figs. Describes and discusses work done in study of reduction of iron oxides in a 300-ton furnace when gases were sampled across a series of planes lying between the tuyere level and stock line.

BOILER FEEDWATER

Heating. Extraction Heaters Increase Cycle Efficiency, K. S. Kramer. Power Plant Eng., vol. 31, no. 15, Aug. 1, 1927, pp. 817–819, 7 figs. Equal amounts of steam bled to different heaters give best results but placing of heaters relatively unimportant.

Locomotive Feed Water Heating, W. C. Hamm. Ry. & Locomotive Eng., vol. 11, no. 8, Aug. 1927, pp. 225–231, 16 figs. Description of various types of heaters in use, their application and advantages effected under operating conditions.

BOILER FIRING

Coke Breeze. Hunts Point Boilers Burn Coke

Breeze. Power, vol. 66, no. 10, Sept. 6, 1927, pp. 350–352, 4 figs. The steam generated by the boilers of the Hunts Point by-product coke plant is used for driving plant auxiliaries and for the coke by-product processes.

Control. Automatic Stoking Regulators (Selbsttätige Feuerungsreglung), T. Stein. V.D.I. Zeit., vol. 71, no. 34, Aug. 20, 1927, pp. 1177–1184, 24 figs. Descriptions and practical experience with German air- and coal-supply regulating devices for high- and low- pressure steam plants operating at full and part load; coal economy due to automatic firing regulation.

Pulverized Coal. Pulverized-Fuel Firing, E. G. Ritchie. Combustion, vol. 17, no. 3, Sept. 1927, pp. 169–172. An aid to economy in the manufacturing industries.

BOILER FURNACES

Pulverized-Coal. The Design of Furnaces for Pulverized Coal, M. Frisch. Combustion, vol. 17, no. 3, Sept. 1927, pp. 159–163, 2 figs. Combustion problem; rate of combustion; importance of turbulence, difficulty of burning solid particles; imflammability; wall temperature and combustion; preheated air.

Walls. Boiler Furnace Walls, J. Wolf. Combustion, vol. 17, no. 3, Sept. 1927, pp. 155–158. Solid refractory, air-cooled, and water-cooled walls.

Water-Cooled. Water-Cooled Furnaces, H. W. Leitch. Gas Age-Rec., vol. 60, no. 10, Sept. 3, 1927, pp. 325–326, 2 figs. Description of water-cooled furnaces at Hell Gate and Sherman Creek, New York.

BOILER PLANTS

Developments in U. S. A. Boiler House Developments in the United States. Eng. & Boiler House Rev., vol. 41, no. 2, Aug. 1927, pp. 66–71, 2 figs. Operation at high percentage of rating; water-cooled furnace walls; automatic boiler control.

Industrial. Rational Design for Low Cost Steam, F. A. Combe. Power House, vol. 21, no. 16, Aug. 20, 1927, pp. 14 and 82. Emulation of large stations; economy considered, need for rational design; unusual methods used.

BOILER PLATE

Embrittlement. Embrittlement of Boiler Plate, S. W. Parr and F. G. Straub. Engineering, vol. 124, no. 3213, Aug. 12, 1927, pp. 216–218. Paper presented at annual meeting of Am. Soc. for Test. Materials, French Lick, Ind., U. S. A., June 20–24, 1927.

BOILERMAKING

Locomotive Boilers. New Boiler Shops at Gorton Foundry, Manchester. Ry. Engr., vol. 48, no. 572, Sept. 1927, pp. 341–343 and 347, 10 figs. These shops, at works of Beyer, Peacock & Co., Ltd., are of large proportions and are laid out and equipped in accordance with most modern methods for manufacturing and repairing locomotive boilers, tenders and tanks.

BOILERS

Benson. Developments with the Benson High Pressure Steam Generator, W. Abendroth. Eng. & Boiler House Rev., vol. 41, no. 2, Aug. 1927, pp. 61–65, 5 figs. Also Eng. Progress, vol. 8, no. 8, Aug. 1927, p. 223, 2 figs. Description of critical-pressure Benson boiler built by Messrs. Siemens-Schuckert.

Electric. Features of Electric Steam Generators, D. Robertson. Elec. News, vol. 36, no. 15, Aug. 1, 1927, pp. 31–33, 4 figs. Heat efficiency may attain 95 per cent, depending on feedwater; power-factor may be slightly leading; cast-iron electrodes best, with life about one year; steam at full load from cold start in five minutes.

The Economics of Electric Generation, P. S. Gregory. Elec. News, vol. 36, no. 17, Sept. 1, 1927, pp. 30–33. The value of electric steam boilers and the fallacy of electric house heating; attitude of mind of customer and company.

Failure Due to Cracking. Investigations of Riveted Boiler Seams That Failed by Cracking Power, vol. 66, no. 9, Aug. 30, 1927, pp. 340–342, 5 figs. Excerpts from paper by S. B. Applebaum, Assistant Technical Manager, The Permutit Co., read before the Nashville meeting of the National Board of Boiler and Pressure Vessel Inspectors.

Locomotive. See LOCOMOTIVE BOILERS.

Stresses. Conditions of Elastic Limit or Bursting in Certain Cases of Hollow Bodies Subjected to Internal Pressure (Les Conditions de limite elastique ou d'eclatement dans quelques cas de corps creux soumis à une pression interieure), J. Seigle. Revue de L'Industrie Minerale, no. 155 and 156, June 1 and 15, 1927, pp. 242–248 and 249–272, 26 figs. General theory of internal-pressure stresses in shells of hollow cylinders and spheres and its application to design and testing of boilers, pipes, compressed-gas drums, hydraulic press cylinders, glass tubes and bottles and pipes under longitudinal tension.

Thermal Distortion. Distortions in Cylindrical Boiler Parts During Operation (Krümmungen zylindrischer Kesselteile während des Betriebes), P. Rönne. Forschungs Arbeiten auf des Gebiete des Ingenieurwesens, no. 292, 1927, 43 pp., 32 figs. Review of earlier researches and studies and report on subsidized observations and experiments, made in Denmark, on thermal stresses in boiler shells, their cause and magnitude, damage resulting from them and ways of obviating by proper design and methods of operation.

BOLTS

Stresses in. Effect of Initial Elastic Stresses on Strained Bolts (Der Einfluss der elastischen Vorspannung auf die Beanspruchung von Schrauben), G. Bersa. Dinglers polytechnisches Jl., vol. 342, no. 12, June 1927, pp. 133–136, 4 figs. Points out cases in which usually negligible initial elastic stresses in bolts and bolted parts may become important and cause overstress of bolt; derives formulas for calculation of such stresses and shows how they may be eliminated in some cases.

BORING MACHINES

Motor-Frame. Motor-Frame Boring, Facing and Recessing Machine. Engineering, vol. 124, no. 3215, Aug. 26, 1927, pp. 264–265, 5 figs. Description of a machine constructed by Smith & Coventry, Ltd., Manchester, England.

BRASS

Forgings. Brass Forging, O. J. Berger. Metal Industry (N. Y.), vol. 25, no. 8, Aug. 1927, pp. 321–323, 12 figs. Methods of manufacturing brass forgings and their advantages over castings.

BRASS FOUNDING

Metallurgy. Explains Brass Metallurgy, E. R. Thews. Foundry, vol. 55, nos. 15, 16 and 17, Aug. 1, 15 and Sept. 1, 1927, pp. 595–597, 639–642 and 683–685. Various phases of brass melting and metallurgy. Aug. 1: Type of furnace employed, kind of scrap used, and chemical composition of alloy melted affect resultant product; desulphurization is accomplished with sodium carbonate. Aug. 15: Phosphorus and silicon in small quantities used for deoxidizers; during melting metal must be protected from gases of combustion; reverberatory furnace is described. Sept. 1: Large quantities of metal are produced best in reverberatory furnace; electrically heated furnaces avoid some of difficulties encountered in other types of melting units.

Practice. The Fundamental of Brass Foundry Practice, R. R. Clarke. Metal Industry (N. Y.), vol. 25, no. 8, Aug. 1927, p. 327. Description of basic laws which control melting and casting of metals and their application to practical foundry operations. Aug.: Dry vs. green-sand molds.

BRONZES

Bearing-Metal. Bearing Metal Bronzes, H. J. Roast and F. Newell. Can. Min. Jl., vol. 48, no. 33, Aug. 19, 1927, pp. 651–659, 35 figs. Also Iron & Steel Can., vol. 10, no. 8, Aug. 1927, pp. 236–244, 35 figs. The essential constants of bronzes in every-day use as determined by a series of tests with metals carried out under practical conditions. Paper read before the Montreal Branch of the Engineering Institute of Canada, October 28, 1926.

C

CABLEWAYS

Hong Kong. Equipment of the Peak Tramways, Hong Kong. Metro. Vickers Gaz., vol. 10, no. 172, July 1927, pp. 161–168, 13 figs. Railway, which extends from Cathedral to the Peak Hotel, connects the town with the European residential district, and has a length of 4689 feet (about 0.88 mile), and rises 1207 feet in that length; steepest gradient is 1 to 2, and average is 1 in $3^3/_4$; maximum speed is 12.5 miles per hour giving a schedule time for complete stopping journey of 10 minutes.

CARS

Dump. Two-way Side Hinged Dump Car. Ry. Mech. Engr., vol. 101, no. 9, Sept. 1927, pp. 602–604, 2 figs. Describes new Magar cars; principal feature lies in operating mechanism of side doors; special valve mechanism permits dumping of entire train, or one or more cars, to either side.

Dynamometer. The Dynamometer Car of the South African Railways. S. African Eng., vol. 38, nos. 2 and 3, Feb. and Mar. 1927, pp. 23–26 and 55–57, 3 figs. Feb.: Purchase of new rolling stock and engines; electrification schemes; new type of elevators; dynamometer car. Mar.: Instruments to ascertain power developed and speeds; articulated coaches; rail motor and road motor services.

CARS, FREIGHT

Standardization. Standard Type Vehicles for Heavy Merchandise, L. M. S. R. Ry. Engr., vol. 48, no. 572, Sept. 1927, pp. 328–329, 136 figs., partly on supp. plates. Describes and illustrates types selected for conveyance of heavy and bulky merchandise on London, Midland & Scottish Railway Co.

CARS, PASSENGER

Dining. Dining Cars for the D. & R. G. W. Ry. Age, vol. 83, no. 9, Aug. 27, 1927, pp. 371–372, 5 figs. Seating capacity for 36 persons; built with blind ends and with end doors, with side doors in the kitchen and passageway.

Parlor-Cafe. D. & H. Remodels Parlor-Cafe Car. Ry. Age, vol. 72, no. 8, Aug. 20, 1927, pp. 345–346, 3 figs. Describes innovations in remodelled car which is divided into smoking and non-smoking compartments and dining room. Total seating capacity is 26.

Suburban Service. C. & N. W. Roller Bearing Suburban Coaches on Exhibition. Ry. Age, vol. 83, no. 10, Sept. 3, 1927, pp. 449–451, 5 figs. Describes new type of passenger cars, 100 of which and 20 combination passenger baggage cars of similar design are being placed in service; cars equipped with Melcher-Hyatt bearings; extensive use of aluminum gives low weight; seating capacity doubled.

Washing. Automatic Washing of Railway Cars (Lavage automatique des Wagons), P. Mareschal. Nature (Paris), no. 2768, Sept. 1, 1927, pp. 214–215, 3 figs. Description of an installation, being put in operation by French railway, consisting of shed provided with high-pressure water jets and rotating rag-brushes.

CAST IRON

Carbon Content, Effects of. Effect of Carbon Content on Properties of Cast Iron (Der Einfluss des Kohlenstoffes auf die Eigenschaften des Gusseisens), E. Diepschlag. Giesserei Zeitung, vol. 24, no. 15, Aug. 1, 1927, pp. 418–420. Modes of occurrence of carbon in pig-iron castings, chemically interpreted; review of German and American work on carbon content effects.

Fatigue. Tests of the Fatigue Strength of Cast Iron, H. F. Moore. Eng. Experiment Station—Univ. of Illinois Bul., vol. 24, no. 40, June 7, 1927, 47 pp., 26 figs. A report of an investigation conducted by the Engineering Experiment Station University of Illinois in coöperation with the Allis-Chalmers Manufacturing Company.

Fluidity. Test Bars to Establish the Fluidity Qualities of Cast Iron, C. Curry. Am. Foundrymen's Assn.—Advance Paper, no. 27–23, June 6–10, 1927, 18 pp., 14 figs. Definition, early investigation, description of test, application of test to non-ferrous work.

Heat-Treated. Heat-Treated Cast Iron. Metallurgist (Supp. to Engr.), Aug. 1927, pp. 116–118, 3 figs. Comments on paper by Prof. Piwowarsky at Sheffield Conference of Inst. of Brit. Foundrymen, July 5–8, 1927.

High-Duty. Effects of Nickel and Chromium on the Strength of Gray Cast Iron (Sur les effets du nickel et du chrome sur la resistance de la fonte grise), E. Piwowarsky. Fonderie Moderne, vol. 21, Aug. 10, 1927, pp. 243–250, 8 figs. Metallographic studies and mechanical tests showing that by accelerated cooling and by adding nickel, or nickel and chromium transverse strength may be increased 130 kg. per sq. mm. and tensile strength may be as high as 75 kg. per sq. mm. Brinell hardness 200 to 300.

High-Grade. Principles of Producing High-Grade Cast Iron (Uber die Grundlagen zur Herstellung hochwertigen Gussiesens), P. Bardenheuer. Giesserei, vol. 14, no. 33, Aug. 13, 1927, pp. 557–561, 10 figs. Brief discussion of known processes, including a metallographic study of microstructure; concludes that all processes tend to induce favorable graphitization.

Nickel and Chromium in. The Economic Value of Nickel and Chromium in Gray Iron Castings, D. M. Houston. Am. Soc. for Steel Treating—Preprint for 9th Annual Convention, Sept. 19 to 23, 1927, 17 pp., 11 figs. Importance of base composition as economic factor is dwelt upon at length, and illustrations are given of nickel-chromium mixtures developed with proper base composition whereby Brinell hardness was uniformly increased twenty to thirty points without impairing machinability at approximately same cost per pound as plain cast iron.

Nickel Cast Iron. Alloy Cast Iron Meets High Duty Requirements. Am. Metal Market, vol. 34, no. 160, Aug. 18, 1927, p. 7, 4 figs. By use of nickel, or nickel and chromium in proper ratio, following improvements may be obtained: 1. Increased strength; 2. greater toughness; 3. uniformity increased hardness with better machinability; 4. reduction in chill; 5. increased wear resistance.

Production of. Progress in the Production of High Duty Cast Iron, E. Piwowarsky. Foundry Trade Jl., vol. 36, no. 18, Aug. 18, 1927, pp. 147–151, 1 fig. Existing specifications; causes of uncertainty of facts; two solutions offered; low melting temperatures vs. superheating; theories developed by science of crystallization; metal poured with a mold with variously heated sections; conclusions drawn from investigations of heated mold sections; relation between melting temperatures, superheating and contraction; relation between chemical composition and superheating; relations between melting temperatures; superheating and contraction; conclusions drawn from superheating experiments; jolting of molten iron; theories based on formation of graphite above critical temperature; hypothetical explanation; process of producing high-duty cast-iron.

Strength of. The Strength of Cast Iron, J. E. Fletcher. Foundry Trade Jl., vol. 36, nos. 570 and 571, July 21 and 28, 1927, pp. 69–72 and 89–92, 5 figs. Calls attention to variations in strength and gives typical examples; combined functions of total carbon and silicon; data presented refers to castings of about $1^1/_4$ in. diameter having approximately same cooling ratio.

Testing. Practical Course in Testing of Cast Iron (Praktischer Kursus in der Materialprüfung von Gusseisen), O. Schwarz. Giesserei-Zeitung, vol. 24, no. 16, Aug. 15, 1927, pp. 441–446, 15 figs. Description of test methods, taught in a special short course at the technical school of Stuttgart, summarizing up-to-date standard German practice in testing elastic properties of cast iron and cast-iron welds, also their microstructure and changes in volume.

Principles of Testing, H. R. Pitt. Foundry Trade Jl., vol. 35, nos. 550 and 551, Mar. 3 and 10, 1927, pp. 193–194 and 213–215. Endeavors to formulate best methods of determining mechanical properties of cast iron and applying, as far as possible, recognized principles and methods of testing to measurement and assessment of its physical values; basic desiderata; theory of transverse testing. Mar. 10: Methods of expressing test results; transverse, fatigue, impact and hardness testing; shear.

Treating. Improving the Quality of Gray Cast Iron (Amelioration des Qualites de la Fonte Grise). Fonderie Moderne, vol. 21, Aug. 10, 1927, pp. 257–262. Compilation on various physical and chemical methods of cast-iron treating, including graphitization; Lanz method of making perlitic cast iron, Corsalli and Dechesne methods, etc.; results of mechanical tests.

CASTING

Centrifugal. Centrifugal Casting of Sheet Bars. Iron & Coal Trades Rev., vol. 115, no. 3102, Aug. 12, 1927, p. 227, 2 figs. Some economic possibilities of the process described by Leon Cammen before the American Society for Steel Treating.

The Centrifugal Casting Process, J. D. Capron. Blast Furnace & Steel Plant, vol. 15, no. 8, Aug. 1927, pp. 376–381. Art of centrifugal casting is reviewed from 1809 to present; deLavaud process employed for casting pipe fully explained; other methods given brief mention.

CASTINGS

Iron Alloys. The Production and Uses of Ni-Cr-Fe and Co-Cr-Fe Castings, J. Ferdinand Kayser. Iron & Coal Trades Rev., vol. 115, no. 3101, Aug. 5, 1927, pp. 202–203. Describes present status of these alloys for castings, and possible future use.

Stresses. Stresses in Non-Ferrous Castings, C. H. Desch. Foundry Trade Jl., vol. 36, no. 570, July 21, 1927, pp. 73–75, 4 figs. Shrinkage characteristics of various non-ferrous metals; from a paper read before the Sheffield Convention of the Institute of British Foundrymen. See also abstract in Brass World, vol. 23, no. 8, Aug. 1927, pp. 259–261, 3 figs.

CENTRAL STATIONS

Berlin, Germany. The Klingenberg Power Station in Berlin, O. Feldmann. S. African Inst. Elec. Engrs.—Trans., vol. 18, part 6, June 1927, pp. 89–105, 22 figs. Historical notes on development of Berlin electricity undertaking; Klingenberg station will have an installed capacity of 540,000 kw.; description of station.

Diesel-Engined. Texas Power Company Is "Diesel Conscious." Oil Engine Power, vol. 5, no. 9, Sept. 1927, pp. 603–606, 6 figs. Description of new plant at Hico, Texas, of the Texas-Louisiana Power Co.

East River, New York. The New East River Generating Station. Elec. Light & Power, vol. 5, nos. 6 and 7, June and July 1927, pp. 81–84 and 96–106, 6 figs. June: Details of layout and equipment. July: Turbines, condensers and electrical features.

Fuel Equipment. Gas and Oil Burners Combined, H. R. Sharpless. Elec. World, vol. 90, no. 11, Sept. 10, 1927, pp. 499–503. System of dual fuel supply, gas and oil, with provision for changeover to use of pulverized coal is feature of Neches power station of Gulf States Utilities Co.; ultimate capacity of station 200,000 kw.

Heat Economy in. Heat Economy in Central Generating and Industrial Plants, H. L. Lewis. Commonwealth Engr., vol. 14, nos. 10 and 11, May 2 and June 1, 1927, pp. 391–398 and 439–443, 13 figs. May 2: Selection of most economical steam pressure; efficiency of high-pressure boilers and of modern steam turbo-generators; high steam temperatures; high-pressure steam and resuperheating. June 1: Fuel savings due to bleeding turbines at one or two successive stages for heating condensate; use of exhaust steam for heating purposes.

Holtwood, Pa. Operation of the Holtwood Steam Station, F. A. Allner. Power Plant Eng., vol. 31, no. 15, Aug. 1, 1927, pp. 840–841, 3 figs. Experience with 20,000-kw. plant designed for close coördination with hydro plant.

Mad River Plant. Mad River Plant of the Ohio Edison Co., P. A. Vickers. Power, vol. 66, no. 12, Sept. 20, 1927, pp. 424–427, 5 figs. Initial unit of 20,000 kw. of Mad River Plant of Ohio Edison Co., near Springfield, Ohio; ultimate capacity, 80,000 kw.; plant contains numerous modern features such as cooling of furnace walls by armored tubes, combination superheaters, economizers, air preheaters, three-stage bleeding to heat feedwater, two-motor fan drive and ash sluicing; feedwater enters boiler at 280 deg. fahr. and combustion air is preheated to 310 deg. fahr.; working steam conditions are 450 lb. pressure and 245 deg. fahr. superheat when passing 120,000 lb. of steam per hour.

Power-Factor Investigations. Power Factor Investigations, L. D. Price. Elec. World, vol. 90, no. 7, Aug. 13, 1927, pp. 301–304, 9 figs. Use of kilovolt-ampere demand meters for testing power-factor conditions in industrial plants; connections charts, reports; test precautions and calibrating facilities.

Short-Circuits in. Short Circuit Phenomena in the Power Plant, W. F. Sutherland. Power Plant Eng., vol. 31, nos. 12, 14 and 16, June 15, July 15 and Aug. 15, 1927, pp. 681–683, 782–784 and 883–885, 9 figs. June 15: Outlines engineering problems due to short circuits on power systems. July 15: Calculation of probable magnitude of short-circuit currents by use of percentage reactance. Aug. 15: Calculation of forces due to short circuits.

South Africa. The Bloemgontein Power Station. S. African Engr., vol. 17, no. 110, June 1927, pp. 3–9, 3 figs. Coal supply, ash handling, boiler plant, feedwater system, turbo-alternators and switchboard.

Steam vs. Water Power. Steam versus Water Power. World Power, vol. 8, no. 44, Aug. 1927, pp. 80–82. Increasing economy of modern steam-generating stations is reducing commercial attractiveness of many hydroelectric developments—those that are developed must be fitted into existing systems.

Toronto. Auxiliary Steam-Electric Power Station and Central Heating Plant for Toronto. Contract Rec. and Eng. Rev., vol. 41, no. 31, Aug. 3, 1927, pp. 760–762. Report submitted by consulting engineers to Toronto hydro-electric commission recommends stand-by system; coking plant not justified at present time.

Waukegan, Ill. 50,000 Kw. Added to Chicago Pool of Power. Power Plant Eng., vol. 31, no. 17, Sept. 1, 1927, pp. 940–943, 5 figs. Third generating unit and novel switching equipment installed at Waukegan Stations.

West Pittston, Pa. Stanton Power Station Burns Anthracite Culm. Power Plant Eng., vol. 31, no. 17, Sept. 1, 1927, pp. 916–922, 7 figs. New base load central station at West Pittston, Pa., is divided in two sections, each having an initial 45,000-kw. turbine with reheat, floating head condensers, house generator and unusual arrangement of circulating pumps.

Whippany, N. J. Northern New Jersey Profits by New Whippany Plant, J. E. Shoudy. Power Plant Eng., vol. 31, no. 15, Aug. 1, 1927, pp. 812–817, 8 figs. New station has novel features; is laid out for extreme reliability of service with boiler house designed to burn hard coal.

CHIMNEYS

Self-Supporting Steel. Self-Supporting Steel Chimneys, H. G. Neer. Mech. World, vol. 82, no. 2117, July 29, 1927, pp. 73–76, 1 fig. Illustration, tables and specification embody full details of 45 sizes of self-supporting brick-lined steel chimneys which have been found completely satisfactory in actual practice.

CHROMIUM PLATING

Developments. Chromium Plating Developments, C. H. Proctor. Metal Industry (N. Y.), vol. 25, no. 8, Aug. 1927, pp. 331–333. Recent advances in the commercial electrodeposition of chromium. From the Monthly Review of the American Electro-Platers' Society.

CLUTCHES

Experiments with. Automobile Clutches (Untersuchung von Kraftwagenkupplungen), E. von Ende. Versuchsergebnisse des Versuchsfeldes für Maschinenelemente, no. 6, 1927, pp. 1–31, 34 figs. Report on experimental study at Berlin Institute of Technology, on disk and cone clutches, particularly under overload and starting conditions; description of experimental equipment and methods; mathematical reduction of results.

Friction, Sliding. Experiments with Sliding Friction Clutches (Versuche mit Rutschkupplungen), G. Weber. Versuchsergebnisse der Versuchsfeldes für Maschinenelemente, no. 6, 1927, pp. 33–48, 10 figs. Experimental determination of friction coefficients of cast iron, Ferodo-fiber, leather and cellulose on cast iron, for various pressures, sliding speeds and temperatures; experimental study of emergency clutch operating on the sliding friction principle showed desirability of materials with static friction coefficient higher than the dynamic.

COAL

Carbonization. Low-Temperature Carbonization of Fuel, D. Brownlie. Power House, vol. 21, nos. 1, 2, 9, 14 and 15, Jan. 5, 20, May 5, July 20 and Aug. 5, 1927, pp. 26–27 and 48, 28–29 and 49, 27–29, 31–32 and 40, and 30–32 and 40, 14 figs. Jan 5: Deals largely with experiment of T. R. Crampton of London, whose first British patent on subject is dated 1868. Jan. 20: Patents covering processes for carbonization of pulverized coal; McEwen-Runge process, primarily for low-temperature carbonization of pulverized coal or other carbonaceous material, but also suitable for medium or high-temperature carbonization. May 5: Operation of McEwen experimental retort at Lakeside Station, Milwaukee, Wis. July 20: Problems of Butterley Co., England, and methods employed in carbonizing pitch briquets from non-coking coal on internal combustion principle, and utilization of gas from two retorts to run gas engines supplying electricity to Colwick Estates. Aug. 5: Experimental work by Stanley Coal & Iron Co., Chesterfield, England, devoted particularly to maximum oil production, and general utilization of refuse colliery material.

Turner Low Temperature Carbonizer. Black Diamond, vol. 79, no. 10, Sept. 3, 1927, pp. 10–11, 1 fig. Turner process of low-temperature carbonization produces no permanent gases; all volatile constituents preserved in condensable form; quality of oil improved by freedom from pitch.

Liquefaction. Utilization of Low-Grade Coal and Liquefaction of Coal (Verwertung bzw. Veredlung minderwertiger Kohle sowie Verflüssigung von Kohle), A. Czermak. Montanistische Rundschau, vol. 19, nos. 11 and 14, June 1 and July 16, 1927, pp. 283–290 and 371–375. Chemistry of coal, classes of low-grade coals, lignite and its utilization by briquetting, distillation, etc.; present status of coal liquefaction including discussion of the Bergius, Fischer, Tropsch and other processes.

Mid-West, Burning. Burning Mid-Western Coals, E. L. McDonald. Mech. Eng., vol. 49, no. 10, Oct. 1927, pp. 1082–1084, 6 figs. Concludes that while each has its own peculiarities and must be burned accordingly, any one of them can be burned if properly handled on proper equipment.

Pulverized. See PULVERIZED COAL.

Rhode Island, Utilization of. Electrolytic Gas to Enrich Low-Grade Fuel Gas, F. G. Clark. Elec. World, vol. 90, no. 7, Aug. 13, 1927, pp. 313–314. Proposes utilizing Rhode Island coal for generation of power and water gas; electrolytic gases made from off-peak power; relief gas holders and new type of gas making.

Storage. The Storage of Coal. Queensland Government Min. Jl., vol. 28, no. 326, July 15, 1927, pp. 271–273. Its deterioration and disintegration; dangers of spontaneous combustion; necessity of avoiding the accession of extraneous heat.

COAL HANDLING

Hydraulic Hoists. New Coal Hoists in South Wales. Engineer, vol. 144, no. 3735, Aug. 12, 1927, pp. 184–185. Description of five 30-ton hydraulically operated fixed coal-hoists erected in South Wales for lifting coal cars so that contents may be shot into ships and barges.

COMBUSTION

Gases. Oxygen Required for the Propagation of Hydrogen, Carbon Monoxide and Methane Flames, G. W. Jones and G. St. J. Perrott. Indus. & Eng. Chem., vol. 19, no. 9, Sept. 1927, pp. 985–989, 2 figs. Presented before the Division of Gas and Fuel Chemistry at the 73rd meeting of the Am. Chem. Soc., Richmond, Va., Apr. 11, 1927.

Liquid Fuels. Combustion of Liquid Fuels, E. A. Allcut. Power House, vol. 21, no. 16, Aug. 20, 1927, pp. 13–14. Liquid fuel is practically 100 per cent volatile matter, problem of combustion depending on three factors, time, space and opportunity; in all cases, turbulence is very considerable factor, increasing possibility of speeding combustion.

CONDENSERS, STEAM

Costs. The Relative Cost of Condensing Plants, D. G. McNair. Power Engr., vol. 22, no. 258, Sept. 1927, pp. 341–342 and 344. Comparison of the initial and operating costs of surface and jet condensers.

CONVEYORS

Bearings and Lubrication. Cutting Down Power Costs on Mechanical Handling Equipment, A. F. Brewer. Indus. Mgmt. (N. Y.), vol. 74, no. 2, Aug. 1927, pp. 101–105, 9 figs. What modern bearings and lubrication methods mean to economical operation.

Cotton Mills. Planning a Cotton Mill Around the Conveyor System, C. M. Mumford and M. G. Farrell. Indus. Mgmt. (N. Y.), vol. 74, no. 2, Aug. 1927, pp. 94–100, 15 figs. Proof of what modern handling methods can do in a traditionally conservative industry.

COOLING TOWERS

Design of. Design of Cooling Towers, T. J. Gueritte. Ferro-Concrete, vol. 19, no. 2, Aug. 1927, pp. 37–45, 5 figs. Reinforced concrete used in construction.

COPPER

Hardened. Hardened Copper. Automotive Mfr., vol. 69, no. 5, Aug. 1927, p. 15. A recovered art; details of ancient cutting tools and the production of their hardened edges; actual hardness of commercial copper.

COPPER ALLOYS

Heat Treatment. The Effect of Heat Treatment on Some Mechanical Properties of 85:15 Copper-Tin Alloy, R. J. Anderson. Am. Metal Market, vol. 34, no. 160, Aug. 18, 1927, pp. 3–6, 13 figs. Metallographic constitution of alloy: prior work on heat treatment of copper-tin alloys; method of investigation; results of tests; microscopic examination; copper-tin alloy; conclusions; bibliography.

CORES

Core Oils. Oil of Amber as Core-Oil for Gray Iron and Steel Foundries (Bernsteinöl als Kernöl für Graugiessereien und Stahlgiessereien). Giesserei, vol. 14, no. 33, Aug. 13, 1927, pp. 561–562. Studies at Claustahl mining academy and practical foundry experience commend use of oil of amber mixed with molasses, in proportions of 40 to 60 per cent or 50 to 50 per cent, as core sand binder.

COST ACCOUNTING

Public Utilities. Accounting Treatment of Depreciation, L. L. Starrett. Elec. World, vol. 90, no. 11, Sept. 10, 1927, pp. 511–512. Utilities in past have failed to provide accurate records of invested capital; an analysis is here given of method devised for exact accounting.

COTTON MILLS

Turbine Drive. Cotton Spinning and the Turbine Drive. Power Engr., vol. 22, no. 258, Sept. 1927, pp. 331–335, 7 figs. Existing boilers modernized, geared turbine installed, and shafting and wheel drives superseded by ropes in Lancashire Mill.

CRANES

Railway Wrecking. Railway Breakdown Cranes, E. G. Fiegehen. Ry. Engr., vol. 48, no. 572, Sept. 1927, pp. 330–331 and 333. Consideration of some difficulties encountered in their design, together with suggested solutions.

CRANKSHAFTS

Stresses. Crankshafts for Airless-Injection Engines, A. Porter. Brit. Motor Ship, vol. 8, no. 89, Aug. 1927, pp. 182–183, 2 figs. Consideration of the stresses involved.

CUPOLAS

Air Control. The Importance of Air Control in Efficient Cupola Practice, P. H. Wilson. Foundry Trade Jl., vol. 36, nos. 569 and 571, July 14 and 28, 1927, pp. 49–54 and 83–88, 15 figs. Efficient working of any cupola depends primarily on quantity of air supplied at suitable pressure according to its capacity; melting capacity of cupola is determined by its effective diameter at melting zone; method of introducing air into furnaces; number and shape of tuyeres; maximum thermal efficiency is obtained when carbon is burned to CO_2 in one stage.

Air Supply. Means of Decreasing Loss-By-Burning in the Melting Zone of Cupola Furnaces (Wege zur Verringerung des Abbrandes in der Schmelzzone der Kupolofen), E. Zimmermann. Giesserei, vol. 14, no. 34, Aug. 20, 1927, p. 573, 5 figs. Charges loss by burning mainly to excess of oxygen in air; discusses problem of automatic air supply regulation and describes regulator for which patent has been applied for.

Linings. Compares Cupola Refractories, G. S.

Schaller. Foundry, vol. 55, no. 17, Sept. 1, 1927, pp. 693–694 and 699. Describes results of extended series of experiments designed to show best materials and best method of application for lining used in cupola.

Mechanical Chargers. Mechanical Charger Feeds Three Cupolas, F. G. Steinebach. Foundry, vol. 55, no. 15, Aug. 1, 1927, pp. 599–603, 10 figs. Equipment installed at Cleveland plant of Westinghouse Elec. & Mfg. Co.

Supplementary Pulverized-Coal Firing. Combustion Process in Cupola Furnaces and the Effect of Supplementary Pulverized-Coal Firing Upon It (Die Verbrennungsvorgänge im Kupolofen und ihre Beeinflussung durch die Kohlenstaubzusatzfeuerung), P. Bardenheuer. Giesserei Zeitung, vol. 24, no. 16, Aug. 15, 1927, pp. 451–455, 5 figs. General discussion of process and results with experimental oven; description of the Holborn-Kurlbaum gas pyrometer; discussion of heat balance; results of tests of high-grade cast iron made in cupola furnaces with supplementary pulverized coal firing.

Theory and Practice. Cupolas in Theory and Practice During Past Decade (Der Kupolofen in Theorie und Praxis der letzten Jahrzehnte), W. Mathesius. Giesserei-Zeitung, vol. 24, no. 13, July 1, 1927, pp. 357–359, 4 figs. Review of cupola melting tests carried out during past ten years, from which a complete theory of process of pig-iron melting in cupola is derived. See also Stahl u. Eisen, vol. 47, no. 30, July 28, 1927, pp. 1229–1241, 11 figs.

CYLINDERS

Locomotive, Repairing. The Electric-Arc Process in Repairing Cylinders, J. M. Vossler. Am. Mach., vol. 67, no. 9, Sept. 1, 1927, pp. 335–338, 10 figs. Advantages of repairing cracked or broken locomotive cylinder by electric-arc process. Placing deposited metal in proper spot; positioning bolts; bridging space.

D

DIE CASTING

Carburetors, Pot Heads and Water-Meter Parts. Die Casting Work in the South. West. Machy. World, vol. 18, no. 8, Aug. 1927, pp. 378–379, 7 figs. Description of work done by Harry W. Hahn Mfg. Co., Los Angeles, Cal.

DIESEL ENGINES

Chemical Industry. The Place of the Diesel Engine in Chemical Industry, E. J. Kates. Indus. & Eng. Chem., vol. 19, no. 8, Aug. 1927, pp. 874–878, 7 figs. Advantages of Diesel engines; reliability; costs; Diesels for secondary power; stand-by applications.

Design. Recent Suggestions in Diesel-Engine Construction, F. E. Bielifeld. Nat. Advisory Committee for Aeronautics—Tech. Memorandums, no. 425, Aug. 1927, 25 pp., 47 figs. Translated from Schiffbau, June 2, 16 and July 7, 1926. See Engineering Index, 1926, p. 232.

Fairbanks-Morse. Developments in Higher Speed Diesel Engines. Oil Engine Power, vol. 5, no. 9, Sept. 1927, pp. 613–616, 6 figs. New line of Fairbanks-Morse Diesels in rating from 30 to 180 hp. show trend in design.

Foos. Higher Speeds, Lighter Weight in New Foos Diesels, M. A. Hall. Automotive Mfr., vol. 69, no. 5, Aug. 1927, pp. 5–7, 3 figs. Advanced ideas incorporated in new model bring marked reduction in weight and bulk, increase in speeds and power development; possible application widened.

Fuel Systems. Fuel Systems of the High-Speed Diesel Engine, W. M. Kaufmann. Power, vol. 66, no. 10, Sept. 6, 1927, pp. 358–359, 3 figs. Discussion of present practices in fuel pumps; outline of high-speed requirements; advantages of various systems.

Marine. The Greatest Marine Diesel Plant in the World (Il piu grande impianto del mondo di motori Diesel per propulsione navale). Ingegneria, vol. 6, no. 5, Mar. 1927, pp. 168–172, 6 figs. Details of four 9000 hp. MAN Savoia, two-cycle, six-cylinder Diesel engines, 125 r.p.m., intended for Italian liner "Augustus;" drawing and results of acceptance tests.

Small Capacity. Small Capacity Diesel Engines (Les Moteurs de Faible Puissance), R. Perisse. Comptes Rendus des Travaux de la Société des Ingenieurs Civils de France—Memoires, vol. 80, nos. 3 and 4, Mar.-Apr. 1927, pp. 451–456. Brief description of some European types of capacities as low as 6 hp., among them Rochefort engines for automobiles and industrial uses.

Textile Mills. The Widening Field of the Diesel Engine Includes the Textile Industry. Textile World, vol. 72, no. 10, Sept. 3, 1927, pp. 62–63, 3 figs. Description of modern two-cycle Diesel; textile installations; speedier and lighter engines.

DRILLING MACHINES

Radial. Radial Drilling Machine Design, H. Bentley. Mech. World, vol. 82, no. 120, Aug. 19, 1927, pp. 127–128, 9 figs. Improvements are (1) increased drilling capacity, (2) increased work-supporting capacity, (3) simpler, easier, and more rapid control.

Spindle Attachment. A Useful Drilling Machine Accessory. Brit. Machine Tool Eng., vol. 4, no. 46, July-Aug. 1927, p. 638, 1 fig. High-speed spindle attachment by Messrs. James Archdale & Co., for fitment on their radial drilling machines; this attachment carries auxiliary spindle which can be run efficiently up to speeds of 2500 r.p.m. and by its use, therefore, it is possible to utilize every small drills at speeds and feeds consistent with modern practice.

12-Spindle Gang. Archdale 12-Spindle Gang Drilling Machine for Carriage and Wagon Works. Brit. Machine Tool Eng., vol. 4, no. 46, July-Aug. 1927, pp. 648–652, 5 figs. New 12-spindle Gang drilling machine recently supplied by Messrs. James Archdale & Co., Ltd., for drilling operations on railway carriage and wagon work in shops of Gloucester Railway Carriage and Wagon Co., Ltd., of Gloucester.

DURALUMIN

Defects and Failures. Duralumin—Defects and Failures, W. Nelson. Aviation, vol. 23, no. 9, Aug. 29, 1927, pp. 476–478, 4 figs. Some of the defects and failures in duralumin most frequently encountered by aircraft industry with indication of their importance.

DYNAMOMETERS

Telescopic. Telescopic Dynamometers (Les Dynamometres Telescopiques), M. R. Guillery. Revue de Metallurgie, vol. 24, no. 7, July 1927, pp. 401–404, 3 figs. Description and tests of light-weight portable dynamometers, of capacity as high as 50 tons compression, specially adapted for regulation of ball-test machines.

E

ELASTICITY

Calculation of Electric Deformation. A Method of Approximate Calculation of the Elastic Deformation, K. Okuda. Soc. of Mech. Engrs.—Jl. (Japan), vol. 30, no. 123, July 1927, pp. 319–334, 3 figs. Elastic deformation of any body subjected to given external forces is calculated frequently by means of energy principle, but in most cases strain energy is only approximately obtained and moreover it is usually very difficult to determine accuracy of calculation; according to new method here proposed, we can obtain higher and lower estimations of strain energy, between which actual value must lie, starting from arbitrarily assumed systems of stresses and displacements respectively. (In Japanese.)

ELECTRIC FURNACES

Forging and Hardening. Notes on the Use of Electric Power for Forging, Normalising and Hardening Drill Steel Bits. S. African Inst. of Elec. Engrs.—Trans., vol. 18, May 1927, pp. 71–82. Discussion of a paper by E. D. Brunner.

Hardening. The Hump Hardening Furnace. Mech. World, vol. 82, no. 2117, July 29, 1927, pp. 79–80, 2 figs. Description of a Leeds and Northrup electric hardening furnace.

High-Speed Frequency Inductive. High-Speed Frequency Inductive Heating, E. F. Northrup. Metal Industry (Lond.), vol. 31, nos. 3 and 5, July 22 and Aug. 5, 1927, pp. 51–53 and 101–103, 6 figs. Paper read before American Electrochemical Society.

Iron Foundries. Charging and Alloy Melting of Steel with Electrical Furnaces (Über Einsatz- und Einschmelzarbeiten beim Lichtbogen-Elektrostahlofen), K. von Kerpely. Centralblatt der Hütten u. Walzwerke, vol. 31, no. 30, July 27, 1927, pp. 409–414. Discussion of processes and advice as to efficient operation of furnaces in producing alloy iron and steel.

ELECTRIC LOCOMOTIVES

Equipment. The Electrical Equipment of the Virginian Railway Locomotives. Engineer, vol. 144, no. 3735, Aug. 12, 1927, pp. 186–187, 3 figs. 2000-kva. phase converter and starting motor; traction motors; air compressor.

ELECTRIC RAILWAYS

Car Design. Light Weight Construction in Modern Tramcar Design, H. C. H. Moller. Elec. Ry. & Tramway Jl., vol. 57, no. 1412, Aug. 12, 1927, pp. 87–88, 5 figs. Outline of present-day requirements in tramway car design, few suggestions for construction of lighter cars.

Seven Months of Car Building, G. W. James, Jr. Elec. Ry. Jl., vol. 70, no. 9, Aug. 27, 1927, pp. 343–347, 11 figs. Trend is toward de luxe equipment, easier riding and noise reduction; definite effort to improve lines and appearance of new cars is being made.

ELECTRIC WELDING, ARC

Stellite. Arc Welding of Stellite, C. M. Rusk. Welding Engr., vol. 12, no. 8, Aug. 1927, pp. 32–33, 6 figs. Great savings are shown in cement mills where grinding rings are reclaimed at low cost and long shutdowns averted.

ELEVATORS

Annunciators. Electric Elevator Signals; How Push-Button Annunciator Systems Operate, F. A. Annett. Power, vol. 66, no. 9, Aug. 30, 1927, pp. 318–321, 14 figs. Circuits and apparatus used with push-button annunciators.

F

FANS

Centrifugal. Application of Dimensional Analysis to Centrifugal Fans, E. M. Fernald. Mech. Eng., vol. 49, no. 9, Sept. 1927, pp. 1004–1005, 2 figs. A mathematical treatment.

FIXTURES

Drilling. Drilling and Pin Assembling Fixtures. B. J. Stern. Machy. (N. Y.), vol. 34, no. 1, Sept. 1927, pp. 53–54, 3 figs. Description of a fixture for drilling a blind hole in a casting.

FLAT PLATES

Deflection in. Soc. of Mech. Engrs—Jl. (Japan), vol. 30, no. 123, July 1927, pp. 335–344. It is attempted in this paper to deduce formulas for deflection and stresses of thin flat equilateral triangular plate loaded uniformly and built in at perimeter, on which, as far as writer is aware, no solution has been published, owing to perhaps limited practical application; at first writer assumes reasonable expression for deflection involving unknown constant, satisfying boundary conditions, and in next place constant is determined by theory of strain energy; then expression of deflection is perfectly fixed, and stresses are obtained in succession; the max. deflection and max. stress thus obtained are about 1.48 and 1.88 times as great respectively as well-known results of clamped circular plate, which is the inscribed one of the equilateral triangles under consideration. (In Japanese.)

FLIGHT

Long-Distance. An Analysis of Recent Trans-Atlantic Flights, L. C. Ramsey and E. H. Kincaid. United States Naval Inst.—Proc., vol. 53, no. 295, pp. 986–999. Survey of Nungesser-Coli, Lindebergh, Chamberlin and Byrd's flights, and summary of facts determined by these flights.

FLOW OF AIR

Measurement. Air-Meter for Engine Research. Soc. of Automotive Engrs.—Jl., vol. 21, no. 3, Sept. 1927, pp. 224 and 326, 2 figs.

FLOW OF FLUIDS

Curved Pipes. Note on the Motion of Fluid in a Curved Pipe, W. R. Dean. London, Edinburgh and Dublin Philosophical Mag. & Jl. of Science, vol. 4, no. 20, July 1927, pp. 208–223, 3 figs. In this paper steady motion of incompressible fluid through pipe of circular cross-section which is coiled in circle is considered.

FLOW OF WATER

Gates and Short Pipes. Flow of Water Through Gates and Short Pipe Sections, W. H. Holmes. West. Constr. News, vol. 2, no. 14, July 25, 1927, pp. 52–54, 10 figs. Calibration of irrigation gates.

Measurement. Precise Weir Measurements, E. W. Schoder. Am. Soc. Civ. Engrs.—Proc., vol. 53, no. 7, Sept. 1927, pp. 1395–1504. Presents results of extensive new volumetric measurements of discharge over weirs of sharp-crested (or nearly sharp) type, occupying full width of channel (that is, without end contractions).

FLYING BOATS

Sikorsky. The New Sikorsky Flying Boat. Aviation, vol. 23, no. 10, Sept. 5, 1927, pp. 522–524, 4 figs. S-36 is an eight seater boat powered with two Wright whirlwind J5C engines and is designed to be fitted with a land chassis.

FLYWHEELS

Detrimental Masses. Detrimental Gyrating Mass (Ueber schädliche Schwungmassen bei Drehschwingungen), F. Vogt. V.D.I. Zeit., vol. 71, no. 35, Aug. 27, 1927, pp. 1221–1223, 3 figs. Mathematical analysis showing that all gyrating masses, from zero up to certain limiting value, in flywheel of reciprocating engines may be unfavorable to operation of generator, on account of resonance.

FORGE SHOPS

Billings & Spencer. Billings and Spencer Forge Plant, C. Longenecker. Forging—Stamping—Heat Treating, vol. 13, no. 8, Aug. 1927, pp. 312–315, 4 figs. Description of one of pioneer companies in drop-forge industry; construction of buildings and equipment in them is presented in detail.

Dodge. Dodge Forge and Heat Treating Plant, C. Longenecker. Blast Furnace & Steel Plant, vol. 15, no. 8, Aug. 1927, pp. 385–395, 11 figs. General description of plant; forge shop exemplifies latest practice in design and equipment; heat treating, cleaning and pickling performed on large production.

FORGING

Swage. Principles of Swage Forging (Die Grundlagen der Gesenkschmiede), J. Pitscheneder. Werkstättstechnik, vol. 21, no. 15, Aug. 1927, pp. 437–440, 17 figs. Brief history; presents and discusses instructions for efficient swage forging.

FOUNDATIONS

Anti-Vibration. Anti-Vibration Installations. Engineering, vol. 124, no. 3215, Aug. 26, 1927, pp. 259–261, 9 figs. Discusses three methods of treatment.

FOUNDRIES

Electric Steel. Preheating Reduces Melting Period, E. Bremer. Foundry, vol. 55, nos. 16 and 17, Aug. 15 and Sept 1, 1927, pp. 626–630 and 674–677, 12 figs. Description of modern steel foundry. Aug. 15: Historical background of electric furnaces; plant of Burnside Steel Foundry Co., Chicago. Sept. 1: Melting of metal and also annealing of castings accomplished in electrical furnaces.

Muffle Furnace. New Works of August's Muffle Furnaces, Limited. Foundry Trade Jl., vol. 36, no. 573, Aug. 11, 1927, pp. 122–124, 4 figs. Description of a new plant.

Savings in. Western Foundry Finds Way to Effect Substantial Savings, C. H. Vivian. Compressed Air Mag., vol. 32, no. 9, Sept. 1927, pp. 2135–

2141, 16 figs. Most modern methods are utilized by a Muskegon plant in producing 400 tons of motor castings daily.

Steel. Steel Foundry Practice Enlarged Upon. Foundry Trade Jl., vol. 36, no. 573, Aug. 11, 1927, pp. 125–127. Discussion of a paper, The Manufacture of a Large Steel Casting, read before the Sheffield Convention by F. A. Melmoth and T. Brown.

FUELS

Changes in Use of. Impending Changes in Our Use of Fuels, A. D. Little. Mech. Eng., vol. 49, no. 9, Sept. 1927, pp. 952–954. Recent developments in the processing of coal to increase its form value, and the possibilities of extension of the gas industry.

Coal. See COAL; PULVERIZED COAL.

Research. The Fuel Research Board. Engineering, vol. 124, no. 3213, Aug. 12, 1927, pp. 193–194. Annual report which has just been issued on behalf of Fuel Research Board of Dept. of Scientific and Industrial Research, together with appended report of Dr. Lander, Director of Fuel Research.

Oil. See OIL FUEL.

FURNACES

Oil, Gas, and Electric-Fired. Oil, Gas, and Electric-Fired Furnaces, F. W. Manker. Iron Age, vol. 120, no. 12, Sept. 22, 1927, pp. 789–790 and 844–845. Advantages and disadvantages of each type analyzed for specific operations; control and atmosphere stressed.

FURNACES, HEAT TREATING

Developments in. Furnace Development in Heat Treating and Forging, W. M. Hepburn. Am. Soc. for Steel Treating—Preprint for 9th Annual Convention, Sept. 19 to 23, 1927, 14 pp., 7 figs. Scientific developments in furnace equipment with particular reference to combustion, refractories, insulation and temperature controls; some outstanding modern gas-fired installations embodying significant developments are described.

FURNACES, INDUSTRIAL

Construction. Binding for Industrial Furnaces, A. E. Perkins. Forging—Stamping—Heat Treating, vol. 13, no. 8, Aug. 1927, pp. 329–330, 1 fig. Author gives calculations required to provide necessary strength in binding of furnaces; relation of binding to furnace life.

Heat Utilization. How Research Has Cut Cost of Heating in Industrial Furnaces, F. W. Manker. Mfg. Industries, vol. 14, no. 3, Sept. 1927, pp. 215–218, 3 figs. $37,500 saved per year in heating forging, boiler efficiency increased to 79 per cent, varnish cooking done from 30 to 75 per cent faster, scale and wasters eliminated by sheet steel normalizing.

G

GAGES

Wear of. Recent Experiments Relating to the Wear of Plug Gages, H. J. French and H. K. Herschman. Am. Soc. for Steel Treating—Preprint for 9th Annual Convention, Sept. 19 to 23, 1927, 26 pp., 11 figs. Results are given of tests made in laboratory wear tester in gaging file-hard high-carbon steel, aluminum "piston alloy" and cast iron; of various gage metals investigated chromium-plated gages showed highest resistance to wear under conditions of metal-to-metal contact; ammonia-treated chromium-aluminum steel, marketed under name Nitralloy, was second in resistance to wear and much superior to remainder of group which showed variations but no radical differences in performance of individual metals.

GARAGES

Bus. Berlin Erects A 200-Bus Garage. Elec. Ry. Jl., vol. 70, no. 10, Sept. 3, 1927, pp. 387–390, 11 figs. One bay is devoted to the daily cleaning, washing and inspection of every bus operating from the garage; the filling station is fitted with overhead charging pipes and can fill two buses a minute.

GAS ENGINES

Operation. Motive-Power Installations Using Producer Gas (Les installations de force motrice au gaz pauvre), J. Brunswick. Pratique des Industries Mécaniques, vol. 10, nos. 4 and 5, July and Aug. 1927, pp. 133–138 and 190–198, 4 figs. Reviews causes of derangements in operation and gives instructions for maintenance and correct, economic operation of such engines.

GEARS

Efficiency, Strength and Durability. The Efficiency, Strength and Durability of Spur Gears, W. H. Rasche. Eng. Experimental Station of Virginia Polytechnic Inst., no. 3, June 1927, 44 pp., 4 figs. A force-efficiency analysis of the Lewis-Webb gear-testing machine.

Spiral Bevel. Cuts Large Spiral Bevel Gears. Iron Age, vol. 120, no. 9, Sept. 1, 1927, pp. 549–550, 2 figs. New Gleason planning generator has capacity for gears up to 60 in. in diameter; unusual accuracy a feature.

GRAIN HANDLING

In Ports. Grain Handling Plant in Port of Lübeck (Die Getreideförderanlage in Lübeck), Wildegans. V.D.I. Zeit., vol. 71, no. 36, Sept. 3, 1927, pp. 1270–1272, 6 figs. Description of two new pneumatic units of 50 tons per hr. capacity each, including air pumps, band conveyors, etc.

GRINDING

Ball-Bearing Manufacture. Generate Radial Surfaces with Precision Abrasive Tools, E. Viall. Abrasive Industry, vol. 8, no. 9, Sept. 1927, pp. 275–277, 6 figs. Description of machines and methods of grinding ball-bearing races.

Centerless. Centerless Grinding of Unusual Jobs, H. Rowland. Can. Machy., vol. 37, nos. 23, 24, 25 and 26, June 9, 16, 23 and 30, 1927, pp. 15–17, 16–17, 9–11 and 89–90, 20 figs. Fundamental structure of centerless grinder, and theories underlying action of regulating wheel showing how round and straight cylindrical parts are produced.

Centerless Grinding of Non-Metallic Parts. Am. Mach., vol. 67, no. 14, Oct. 6, 1927, pp. 527–530, 6 figs. Possibilities of finishing non-metallic parts by means of centerless machine includes fiber, carbon, glass, wood, rubber, bakelite, celluloid, zylonite, pyrolene, kyloid, casein, pearl and other button materials, spark plug cores, rawhide, and porcelain.

GRINDING MACHINES

Small Parts. 10 in. by 18 in. Model "B" Plain Grinding Machine. Brit. Machine Tool Eng., vol. 4, no. 46, July-Aug. 1927, pp. 625–627, 4 figs. Provided with special facilities for rapid and convenient handling with view to obtaining maximum production with minimum amount of effort on part of operator; this type of machine is in continual and increasing demand particularly in motor-car industry and allied trades, where there are large quantities of small parts to be ground.

Surface. New Churchill Opensided Surface Grinding Machine. Brit. Machine Tool Eng., vol. 4, no. 46, July-Aug. 1927, pp. 639–641, 2 figs. In this article is described new opensided surface grinding machine that has recently been developed by Churchill Machine Tool Co., Ltd., of Manchester; this machine is of disk-wheel type and is arranged with hydraulic traverse mechanism to table; it is distinctly precision-type machine and is unequaled for rapid production of accurate and highly finished flat surfaces.

Worm-Thread. Automatic Worm Grinding Machine. Machy. (Lond.), vol. 30, no. 976, Aug. 25, 1927, pp. 655–656, 5 figs. Description of Pratt and Whitney automatic worm-thread grinding machine.

Automatic Worm Thread Grinding Machine. Machy. (Lond.), vol. 30, no. 774, Aug. 11, 1927, pp. 601–602, 2 figs. A universal automatic grinding machine made by Brown & Sharpe Mfg. Co.

H

HARDNESS

Tests of. The Application and Uses of Hardness Tests, W. Deutsch. Eng. Progress, vol. 8, no. 8, Aug. 1927, pp. 216–218, 5 figs. Discussion of various types of hardness tests.

HEAT TRANSMISSION

Building Walls. Standard Test Code for Heat Transmission of Walls. Am. Soc. of Heat. & Vent. Engrs.—Jl., vol. 33, no. 8, Aug. 1927, pp. 505–507 and (discussion) 508–512. Report of the Committee on Testing Insulating Materials for wall construction.

Calculation of. Notes on the Calculation of Problems in Heat Transfer, J. R. Zwicki. Refrigerating Engr., vol. 14, no. 3, Sept. 1927, pp. 100–103, 3 figs. The logarithmic mean temperature difference is shown by author to be applicable only in a special case of heat flow, when specific heats of the two liquids passing through the exchanger are constant, and their flow steady; this is shown for the ammonia condenser, and countercurrent cooler of a liquid air column, where differences of as much as 40 per cent may exist between the effective and logarithmic mean differences; except in one case, the latter function has no real meaning and is only an approximation if used; graphical method is discussed, by means of which effective mean difference can be found; this method lends itself to finding the true value of the coefficient of heat transfer at any point of cooling surface; these points have an interesting bearing on materials of refrigeration.

Radiation. Heat Transmission by Radiation from Non-Luminous Gases, H. C. Hottel. Indus. & Eng. Chem., vol. 19, no. 8, Aug. 1927, pp. 888–894, 6 figs. Amount of heat transmitted from a gas to its bounding surface may be calculated when gas and surface temperatures, gas composition, and the shape of apparatus are known; data and formulas given in paper are sufficient to solve most problems of this type. From a paper before the American Institute of Chemical Engineers, Cleveland, Ohio, May 31 to June 3, 1927.

Temperature Distribution. Determining Temperature Distribution. Elecn., vol. 99, no. 2568, Aug. 19, 1927, pp. 225–226. A contribution to the evaluation of the flow of heat in isotropic media.

HEATERS

Extended-Surface. Designing a Gravity Extended Surface Heating Unit, R. N. Trane. Am. Soc. of Heat. & Vent. Engrs.—Jl., vol. 33, no. 6, June 1927, pp. 373–380, 19 figs. Steps in development of a gravity-type copper heating unit.

HEATING

Industrial, Control. Industrial Heating Control, P. H. Clark. Gen. Elec. Rev., vol. 30, no. 9, Sept. 1927, pp. 446–452, 12 figs. Working limits of industrial temperatures; thermostat control; potentiometer control; panels; overload protection; temperature limit fuses.

HEATING AND VENTILATION

Garages. Report of the Work of the Conference Committee on N.F.P.A., on Heating and Ventilation of Garages, O. N. Walther. Am. Soc. of Heat. & Vent. Engrs.—Jl., vol. 33, no. 8, Aug. 1927, pp. 482–488.

Schools. Heating and Ventilating of Toronto Schools, J. S. Patterson. Am. Soc. of Heat. & Vent. Engrs.—Jl., vol. 33, no. 9, Sept. 1927, pp. 573–576. Types of heating and ventilating equipment used in Toronto (Canada) schools.

HEATING, STEAM

Capacity of Risers. Capacity of Up-Feed Steam Heating Risers for One and Two-Pipe Systems, F. C. Houghten and M. E. O'Connell. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 33, no. 9, Sept. 1927, pp. 545–567 and (discussion) 567–572, 26 figs. Investigation of critical velocity and its bearing on pipe sizes for steam heating systems was undertaken at the Research Laboratory of the Am. Soc. of Heat. & Vent. Engrs. early in 1922; object of this study was to determine allowable velocities of steam with counter flowing condensate in various parts of heating system; when problem was first studied, it was thought that limiting or critical velocity would be found somewhere in neighborhood of 16 ft. per second, above which system would not operate satisfactorily; piping for early work was limited to single section of riser or horizontal pipe under test, 10 ft. in length or shorter; this pipe was connected to radiator with and ell instead of the usual branch including radiator valve and other fittings.

Central Plant. High-Grade Steam Heating Equipment for Group of Institutional Buildings, T. F. Moffett. Plumbers Trade Jl., vol. 83, no. 5, Sept. 1, 1927, pp. 462, 464–465 and 476, 10 figs. Description of heating plant of Marsh Foundation, an orphanage, at Van Wert, Ohio.

Heat Accumulators. Heat Accumulators for Central Heating and Hot-Water Installations (Wärmespeicher fur Grossheizungs und Heisswasser-Bereitungs-Anlagen), H. Balcke. Gesundheits-Ingenieur, vol. 50, no. 30, July 23, 1927, pp. 550–556, 13 figs. Construction, theory and operation of Rateau heat accumulators with liquid or solid heat-storing media.

Low Pressure, Design of. Design of Low-Pressure Steam-Heat Systems with Special Reference to General Regulation (Die Berechnung von Unterdruck- Dampfheizungen mit besonderer Rücksicht auf die generalle Regelung), O. Walger. Gesundheits-Ingenieur, vol. 50, no. 33, Aug. 13, 1927, pp. 597–600, 2 figs. Gives fundamental theoretical and empirical formulas, also table and curves of steam pressure as function of difference between outdoor and indoor temperatures, and heat transmission as function of difference between steam and room temperatures.

Radiator Exposure. Effect of Enclosures on Radiator Performance, A. P. Kratz. Am. Soc. of Heat. & Vent. Engrs.—Jl., vol. 33, no. 6, June 1927, pp. 353–364, 9 figs. Object of this particular phase of investigation was to determine effect of various types of radiator enclosures and shields on steam-condensing capacity of unenclosed radiator.

HYDRAULIC TURBINES

Building a Spiral Casing. Building a Spiral Water Turbine Casing, C. E. Lester. Boiler Maker, vol. 27, no. 8, Aug. 1927, pp. 218–223, 6 figs. Methods employed at Newport News shipyard for the construction of a complicated plate layout and assembly job.

Niagara Falls. Hydro-Electric Turbines in General and for Niagara in Particular, F. Nagler. West. Soc. of Engrs.—Jl., vol. 32, no. 7, Aug. 1927, pp. 233–242, 10 figs. This paper describes hydraulic end of Niagara Falls unit; it gives interesting comparison of types of water wheels that have been used since ancient times to generate power and shows application of each; Niagara unit is largest single prime mover yet built, although excelled in capacity by some steam turbines made up of several units in tandem; it attains remarkable efficiency of 93.8 per cent or including generator it delivers more than 90 per cent of the potential energy of the water to the switchboard.

Testing. Testing Hydraulic Turbines, F. J. Taylor. Elec. Times, vol. 72, no. 1867, Aug. 4, 1927, pp. 141–142, 3 figs. Discussion of Gibson method for testing hydraulic turbines, with description of apparatus and procedure.

HYDROELECTRIC DEVELOPMENTS

Canada. Power Developments on Gatineau River, R. C. Howe. Can. Engr., vol. 53, no. 7, Aug. 16, 1927, pp. 217–221, 7 figs. Progress of construction at Chelsea, Farmer's Rapids and Paugan Falls; storage system to regulate flow of river; water control system evolved to synchronize with peak-load requirements; conservation of water a dominating factor.

Potential 616,000 H.p. at Bridge River Development by B.C.E.R. Co. Elec. News, vol. 36, no. 17, Sept. 1, 1927, pp. 27–29, 3 figs. Two 610-hp. Diesel engines installed for construction purposes; rock tunnel 13,200 feet long to be bored.

Rhine. Utilizing the Upper Rhine and the Rhine Falls By-Pass for Power Development and Navigation (Die Schiffbarmachung und Wasserkraftnutzung des Hochrheines und die Umgehung des Rheinfalles), E. Gutzwiller. Werft-Reederei-Hafen, vol. 8, no. 14, July 22, 1927, pp. 289–292, 3 figs. Outline of a project for developing 4000 million kw-hrs. on the Upper Rhine, including the falls at a cost of about 34,000,000 marks, and one pfenig cost production of one kw-hr.; also sketch of a plan for making the 215 km. reach between Basel and Bregenz, navigable at a cost of about 535,000 marks per kilometer.

HYDROELECTRIC PLANTS

Conowingo. Conowingo Hydro-Electric Power Project, G. R. Strandberg. Eng. & Contracting, vol. 66, no. 8, Aug. 1927, pp. 363–367, 7 figs. Description of the project and the construction plan used in executing the work.

Operating Plans and Expected Costs of Conowingo. Elec. World, vol. 90, no. 7, Aug. 13, 1927, pp. 307–310. Plant will ultimately develop 594,000 hp. in eleven 40,000-kva. generators; expected distribution of investment and method of operating under light and peak loads during low- and high-flow periods.

High-Pressure Pipe Lines. The High-Pressure Pipe Lines for the Vernayaz and Illsee-Turtmann Power Stations in the Canton of Valais, Switzerland. Sulzer Technical Rev., no. 2, 1927, pp. 8–15, 10 figs. Pipe line at Vernayaz station has total fall of 2182 ft., net fall, 2067 ft., 500 cu. ft. per sec.; pipe diameter 1400 mm. at top, 1200 mm. at bottom; one at Illsee-Turtmann has total fall of 2435 ft., 17.6 to 70 cu. ft. per sec.; pipe diameter varies from 48 to 30 in.

I

ICE PLANTS

Diesel-Engine Drive. Diesel Engine Drive for Ice Plants, R. L. Howes. Refrig. World, vol. 62, no. 9, Sept. 1927, pp. 18–20. Studies power problem of ice plant from point of view of different types of Diesel engines, type of drives available, hp. requirements and probable cost of operation.

Florida. New Orlando, Florida, Ice Plant, G. C. Hyde and G. Braungard, Jr. Ice & Refrigeration, vol. 73, no. 3, Sept. 1927, pp. 133–136, 6 figs. General description of the Florida public service company's plant at Orlando, Fla.; illustrations of the equipment; every new device used to secure highest efficiency and produce best quality of ice.

Philadelphia. New Ice Plant Marks Refrigeration Progress. Power Plant Engr., vol. 31, no. 18, Sept. 15, 1927, pp. 999–1001, 4 figs. Philadelphia plant has high-speed compressors, tubular-type condensers, synchronous motors, and other modern refrigerating equipment.

INDUSTRIAL MANAGEMENT

Accidents and Production. Accidents and Production, W. L. Wallace. Mech. Eng., vol. 49, no. 9, Sept. 1927, pp. 949–951. Summary of a report of an investigation by American Engineering Council.

Cost Accounting. See COST ACCOUNTING.

Depreciation. Principles of Depreciation, J. J. Berliner. Paper Industry, vol. 9, no. 5, Aug. 1927, pp. 779–782. Their application in determining when equipment should be scrapped.

Employees' Representation. Industrial Leadership Through Employee Representation, J. E. Edgerton. Mfg. Industries, vol. 14, no. 3, Sept. 1927, pp. 185–186. Reply to organized labor's attack on "Company Unions."

Factory Control. A Simple Method of Factory Control, A. E. Codling. Machy. (Lond.), vol. 30, no. 776, Aug. 25, 1927, pp. 653–654, 3 figs. Details of a simple method of factory control.

Maintenance. Some Problems of the Factory Maintenance Engineer, L. H. Hopkins. Belting, vol. 30, nos. 3 and 4, Mar. and Apr. 1927, pp. 15–17 and 24–26, 2 figs. Mar: Systematic inspection of equipment and full coöperation between maintenance and manufacturing departments essential. Apr.; Definite oiling schedules and thorough cleaning at proper intervals.

Measuring Direct Labor. Predetermined Costs Provide an Effective Means for Measuring Direct Labor, F. A. Hayes. Textile World, vol. 72, no. 9, Aug. 27, 1927, pp. 49–55. Absorption of overhead important; effect of disposition of unearned portion on price and inventory.

Rate Fixing. Rate-Fixing. Automobile Engr., vol. 17, no. 231, Aug. 1927, pp. 312–316, 7 figs. The general principles involved in determining equitable figures.

Scientific Method in. The Scientific Method in Industry, G. P. Cole. Eng. Jl., vol. 10, no. 9, Sept. 1927, pp. 415–420. Its necessity at present time and some examples of its application; states that there is nothing new in scientific method but that it is simply case of planning ahead, devoting sufficient thought to problem at hand, and utilizing every possible source of information.

Stock Control. Stock Control, T. Bancroft. Machy. (Lond.), vol. 30, no. 774, Aug. 11, 1927, pp. 588–592, 11 figs. Classification and location of stocks; material records and control; purchase of materials, issue of materials; perpetual inventory system; purchase and stores journals.

Textile Mills. Equipment, Personnel and Management of an Efficient Textile Mill Supply Room. Textile World, vol. 72, no. 10, Sept. 3, 1927, pp. 59–61, 3 figs. Qualifications of the storekeeper; indexes; stores ledger accounts; results of proper operation.

INDUSTRIAL TRUCKS

Dispatching. How the Westinghouse Plant Gets Maximum Service from Electric Industrial Trucks, R. E. Jansen. Indus. Mgmt. (N. Y.), vol. 74, no. 2, Aug. 1927, pp. 106–111, 11 figs. A dispatch plan that provides adequate control and efficient service.

INTERNAL-COMBUSTION ENGINES

Crankless. Michell Crankless Gas Engines and Boosters. Gas Jl., vol. 179, no. 3352, Aug. 17, 1927, pp. 385–387, 2 figs. Description of a crankless engine, 300 hp. at 750 r.p.m., and a crankless gas compressor, which are in operation at the Sydney (Australia) Gas Works.

Efficiency of. The Ideal Efficiency of Internal-Combustion Engines, W. T. David. Engineering, vol. 124, no. 3218, Sept. 16, 1927, p. 371. Two suggestions are put forward (1) that ideal efficiencies of internal-combustion engines calculated upon basis of generally accepted specific heat and dissociation data are too low, and (2) that ideal efficiencies increase with compression ratio at rate not only greater than that indicated by air standard but also greater than that indicated by ideal efficiency calculations based upon usual specific-heat data.

Exhaust-Heat Recovery. The Recovery and Utilization of Heat from the Exhaust Gases of Internal-Combustion Marine Engines, T. Clarkson. Mech. World, vol. 82, no. 2119, Aug. 12, 1927, pp. 115–116. Boilers for use of waste heat, and problems in waste-heat recovery. Paper read before Institute of Marine Engineers, Inc.

Steam Cooling. The Application of Steam Cooling to Internal-Combustion Engines, H. T. Davey. Mech. World, vol. 82, no. 2117, July 29, 1927, p. 78, 1 fig. Short note explaining the system and its advantages.

Two-Cycle. Crankcase Scavenging of a Two-Stroke-Cycle Engine, O. Holm. Power, vol. 66, no. 8, Aug. 23, 1927, pp. 278–280, 6 figs. Test of a two-stroke-cycle engine with crankcase scavenging; effect of changing the height of the scavenging and the exhaust slots upon the scavenging efficiency, determined by analysis of the gases.

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; GAS ENGINES; OIL ENGINES.]

IRON

Armco. Armco Ingot Iron, R. L. Kenyon. Am. Soc. for Steel Treating—Preprint for 9th Annual Convention, Sept. 19 to 23, 1927, 59 pp., 36 figs. Scope of paper includes description of material, its chemical analysis, its microstructure after various treatments and effect of mechanical work and heat treatment on its various physical properties; data are given for Armco ingot iron in form of hot-rolled and cold-rolled bars and shapes, plates, sheets and wire; tests reported include tension, compression, shearing, impact, hardness and fatigue tests of various kinds.

Microstructure. Some Unusual Microstructures in Iron, F. S. Tritton. Metallurgist (supp. to Engineer), June 1927, pp. 88–90, 6 figs. Unusual microstructures described have been observed in specimens of iron during course of metallurgical research in a modern laboratory, and illustrate that iron still exhibits some phenomena that are not well known or understood.

IRON AND STEEL

Bend Test. A Critical Study of the Bend Test as Applied to Iron and Steel, A. B. Kinzel. Am. Soc. for Steel Treat.—Advance Paper, no. 8, for mtg. Sept. 19 to 23, 1927, 15 pp., 10 figs. This paper includes theoretical study of strains produced on bending rectangular bar; from theory there is deduced method for quantitative evaluation of bend test; phenomena of inside crack is investigated and relation between tensile and bend elongation is discussed; specifications for routine quantitative bend testing are given together with precautions and limiting factors involved.

Gases in. Gases in Molten Iron and Steel. Metallurgist (Supp. to Engineer), June 1927, p. 87. Method of determining gas contained in a known volume of molten iron or steel, intended primarily for work on a small laboratory scale; masses of metal used varying from 150 to 90 grams.

IRON ALLOYS

Manganese. Alloys of Iron and Manganese Containing Low Carbon, R. Hadfield. Foundry Trade Jl., vol. 36, no. 18, Aug. 18, 1927, pp. 157–158. Comparison of two types of alloys of iron and manganese, one with carbon varying from about 0.50 to 1.20 per cent and the other with little or no carbon, 0.08 to 0.20 per cent.

IRON CASTINGS

Artistic. Recent Artistic Iron Castings (Neuer Eisenkunstguss), G. Grundmann. Giesserei, vol. 14, no. 34, Aug. 20, 1927, pp. 573–575, 5 figs. Description of artistic work of Lauchhammer foundry in Saxony.

Diesel-Engine. Castings for Diesel Engines, H. Matsuura. Foundry Trade Jl., vol. 36, no. 575, Aug. 25, 1927, pp. 175–177. Report of investigation carried out at Niigata Engineering Works, Japan; strength of cast iron at elevated temperatures; wearing qualities of cast iron; properties of high manganese semi-steel.

Production. Stepping Up Production Mechanically, Pat Dwyer. Foundry, vol. 55, no. 15, Aug. 1, 1927, pp. 588–592, 7 figs. Second article in series of three dealing with methods and equipment for making heat radiation castings at Austin Arcola plant of Am. Radiator Co., Buffalo. How molds are made, handled and poured.

Pulleys, Cracking of. Why Do Pulley Arms Crack? H. N. Tuttle. Foundry, vol. 55, no. 17, Sept. 1, 1927, pp. 695–696, 8 figs. Uneven cooling speed sets up contraction strains that cause distortion; remedies suggested where due to design, melting or molding practice.

Scrapping. Scrapping a Large Grey Iron Casting. Foundry Trade Jl., vol. 36, no. 571, July 28, 1927, p. 81. Top portion of large press, weighing 17 tons, successfully scrapped in $6^1/_2$ hours.

K

KEROSENE

Carburetion of. Carburetion of Kerosene, C. S. Kegerreis, H. A. Huebotter and M. J. Zucrow. Purdue Univ.—Eng. Departments Bul., vol. 11, no. 6, Mar. 1927, 38 pp., 32 figs. In recent years volatility of motor gasoline has decreased; anticipating its trend toward kerosene as a limit, data on carburetion of kerosene are here presented to provide additional information concerning effect of fuel volatility on carburetion problem, to show how an engine operating on kerosene reacts to variations in strength and temperature of mixture, to point out optimum temperature for satisfactory performance, and to specify correct mixture ratios for economy and for power.

L

LABORATORIES

Aerodynamic. Aero-Dynamics Laboratory at Stanford University, R. H. McDonnell. West. Constr. News, vol. 2, no. 14, July 25, 1927, pp. 50–51, 1 fig. A brief description of Guggenheim Aerodynamic Laboratory, Stanford University.

LACQUER

Surfacers. Lacquer Surfacers, F. M. Beegle and C. M. Simmons. Indus. & Eng. Chem., vol. 19, no. 9, Sept. 1927, pp. 971–972. A good lacquer surfacer can be manufactured on a burr stone mill; combination of oil, chemical plasticizer and gum solution makes a good grinding medium; satisfactory lacquer for production work must stand a good water test; gum is essential for water proofness, adhesion and satisfactory rubbing properties; gums are satisfactory in following order: shellac, dammar and ester gum, and kauri; however, a combination of dammar and ester gum may be used with satisfactory results; half-second cotton gives better results than cotton of higher viscosity reduced to $^1/_2$ second viscosity; of all pigment combinations used, white lead and keystone filler showed best results after 6 months' outdoor exposure, both with and without finishing lacquer sprayed over surfacer.

LATHES

Capstan. A New Capstan Lathe. Brit. Machine Tool Eng., vol. 4, no. 46, July-Aug. 1927, pp. 628–631, 5 figs. Single pulley all-geared type of lathe, with center height of 7 in., capable of performing much wider range of work than is possible on machines of $6^1/_2$ in. center height.

Nut Facing. Nut Facing Lathes. Brit. Machine Tool Eng., vol. 4, no. 46, July-Aug. 1927, pp. 633–634, 2 figs. Special machine for making one face of nut perfectly square to thread; built in two sizes, for nuts having from $^1/_2$ to $1^1/_2$ in. thread diameter, and for nuts having from $1^1/_2$ to $3^1/_2$ in. diameter.

LOCOMOTIVE BOILERS

Explosions. Account of Two Explosions on Locomotive Boilers of American Make (Chaudières de locomotives de provenance Américaine), R. DuBois. Annales des Mines, vol. 11, nos. 5 and 6, May and June 1927, pp. of 277–345 and 361–385, 64 figs. Investigation of causes of explosions occurring at La Rochelle in 1920 and at Toulouse Raynol in 1921; first named explosion commenced with deformation of left wall of furnace, at end where staybolts had been previously broken or weakened; there was no lack of water. Details of Toulouse explosion, its probable causes; observations on fractures and sheared rivets.

LOCOMOTIVES

Diesel. Diesel-Locomotive with Gear Drive. Eng. Progress, vol. 8, no. 8, Aug. 1927, pp. 197–198, 4 figs. Drive gear of 1100-hp. 400-r.p.m. Diesel locomotive.

Stepped-pinion Geared Diesel Locomotives vs. Steam Locomotives and Diesel Locomotives with Continuously Varying Gear Transmission (Ueber das Verhalten der Diesel-Lokomotive mit Stufengetriebe Gegenüber der Dampflokomotive und der Diesel-Lokomotive mit stetig veränderlicher Uebersetzung), F. Achilles. Verkehrstechnik, vol. 40, no. 31, Aug. 5, 1927, pp. 528–531, 9 figs. Comparative study showing performance of first type is inferior, under most commonly occurring conditions, to that of second and third types, in fact is quite impractical.

Electric. See ELECTRIC LOCOMOTIVES.

4-8-4 Type. New 4-8-4 Locomotives, Canadian National Railways. Ry. Gaz., vol. 47, no. 6, Aug. 5, 1927, p. 174, 1 fig. Engines of exceptional power for long-distance passenger or fast freight services.

4-6-0 Type. New 4-6-0 Type Express Passenger Engines, L.M.S.R. Ry. Gaz., vol. 47, no. 6, Aug. 5, 1927, p. 164, 1 fig on p. 170. These locomotives have three single-expansion cylinders and 250-lb. boiler pressure; they have been specially designed for the Anglo-Scottish services and built by the North British Locomotive Co., Ltd., Glasgow.

Germany. Locomotive Standardization in Germany, G. Harcavi. Ry. Gaz., vol. 47, no. 9, Aug. 26, 1927, pp. 256–260, 3 figs. The German Railway's locomotive standardization bureau has prepared designs for 16 classes of locomotives, with detailed arrangements that will permit of economical construction and maintenance.

High-Pressure. L. and N. E. Rly. Locomotive with High-pressure Boiler. Engineer, vol. 144, no. 3737, Aug. 26, 1927, p. 237. Comparison of operation of

ocomotive at 220-lb. pressure with original at 180 lb.

Internal-Combustion. Internal-Combustion Locomotives with Shelest Mechanical Gas Generators, A. N. Shelest. Eng. News (Russian), no. 7, 1927, pp. 288–293, 12 figs. Detailed description of piston drive, oil locomotive of 25.3 per cent thermal efficiency costing about $1^1/_2$ times as much as an equivalent steam locomotive; sketch of a projected turbo-generator locomotive.

Internal-Combustion vs. Steam. Economics of Internal-Combustion Locomotives, A. H. Shelest. Eng. News (Russian), no. 7, 1927, pp. 285–288, 3 figs. Analyzes fixed charges and operating costs of large steam and internal-combustion locomotives assuming for latter thermal efficiency about 5 times greater than for first and concludes that limiting cost of one combustion locomotive must not exceed cost of two steam locomotives.

Manufacture of. Manufacture of Locomotive Cylinders and Piston Rings by the Paris-Orleans Railway Company (Note relative à la fabrication des cylindres de locomotives et des segments de piston par la Compagnie des Chemins de fer Paris-Orleans), L. Audo. Fonderie Moderne, vol. 21, Aug. 10, 1927, pp. 251–256, 7 figs. Describes fusion and casting methods, testing of metal with Fremont machines.

Northern Type. Building The Empire's Biggest Engine. Can. Machy. & Mfg. News, vol. 38, no. 14, Sept. 1, 1927, pp. 15–18, 4 figs. New series of locomotives under construction in Montreal and Kingston for Can. Nat. Rys. embody many special features and surpass in weight, length and power any engine yet constructed in the Dominion.

Pacific Type. A Modern Locomotive Improved. Ry. Gaz., vol. 47, no. 8, Aug. 19, 1927, pp. 222–223, 3 figs. The tractive effort of the L.N.E.R. Pacific type locomotive no. 4480 has been considerably increased by the fitting of a new boiler carrying a higher pressure, while addition has been made to the adhesion weight.

Simple Mallet. Denver & Rio Grande Simple Mallet Locomotives. Ry. & Locomotive Eng., vol. 11, no. 8, Aug., 1927, pp. 221–222, 2 figs. Has largest horsepower output of any coal-burning locomotive ever built.

Smokebox Regulator. A New Type Smokebox Regulator for Superheater Locomotives. Ry. Gazette, vol. 47, no. 11, Sept. 9, 1927, pp. 308–309. Arrangement which on grounds of ready accessibility and low maintenance cost makes it especially attractive to locomotive engineers.

Switching. Three-cylinder 0–8–0 Type Switchers. Ry. Mech. Engr., vol. 101, no. 9, Sept., 1927, pp. 589–591, 3 figs. Describes locomotives being used by Indiana Harbor Belt for hump yard and transfer service; tractive force with booster, 89,500 lb.

Turbo-Condensing. Recent Progress in Steam Locomotives (Die neuere Fortentwicklung der Dampflokomotiv), R. P. Wagner. Zeit. des Osterr. Ingenieur u. Architekten Vereines, vol. 79, nos. 29–30 and 31–32, July 22, and Aug. 5, 1927, pp. 272–277 and 292–297, 22 figs. Description and discussion of recent turbo-condensing Zoelly-Krupp locomotives.

2-8-8-2. Ten 2-8-8-2 Type Locomotives for the D. & R. G. W. Ry. Age, vol. 83, no. 10, Sept. 3, 1927, pp. 435–438, 8 figs. Describes four cylinder simple articulated 2–8–8–2 type locomotive built by American Locomotive Co. for Denver & Rio Grande Western; locomotives have maximum tractive force of 131,800 lb. at 70 per cent cut-off, believed to be largest power output of any coal-burning locomotive every built.

2-8-2 Type. New 2–8–2 Type Locomotives for Kenya & Uganda Railway. Ry. Gaz., vol. 47, no. 6, Aug. 5, 1927, pp. 168, 3 figs. on pp. 171–172. These engines are believed to be the heaviest and most powerful non-articulated type locomotives as yet constructed for the meter gage.

2-8-2-Type Superheater Locomotive for the Kenya and Uganda Railway. Engineering, vol. 124, no. 3213, Aug. 12, 1927, pp. 199–200, 4 figs. Description with principal data.

LUBRICANTS

Cutting Oils. Cutting and Soluble Oils, H. L. Kauffman. Am. Mach., vol. 67, no. 9, Sept. 1, 1927, pp. 343–344. Soluble compounds in paste form are useful where it is difficult to use liquid lubricants; care and handling of compounds.

Viscosity. Effect of Pressure on the Viscosity of Oils and Its Significance in Lubrication (Untersuchungen über den Einfluss des Druckes auf die Zähigkeit von Ölen und seine Bedeutung für die Schmiertechnik), S. Kiesskalt. Forschungs Arbeiten Auf Dem Gebiete Des Ingenieurwesens, no. 291, 1927, 14 pp., 8 figs. Report of experimental study at the Karlsruhe Institute of Technology; review of earlier theoretical and experimental studies in Europe and America; theory and laboratory practice of measuring viscosity under pressure; effects of pressure and temperature on viscosity expressed by empirical formulas; viscosity of lubricating oils should be sensitive to pressure at high temperature but insensitive to temperature changes.

LUBRICATION

Ball Bearings. High-Speed Ball-bearing Lubrication, S. Madsen. Wood-Worker, vol. 46, no. 6, Aug. 1927, pp. 41–42. Particularly as applied to woodworking machinery.

Surfaces. The Lubrication of Surfaces under High Loads and Temperatures, T. E. Stanton. Engineering, vol. 124, no. 3216, Sept. 2, 1927, pp. 312–313, 4 figs. Investigation carried out at Nat. Physical Lab. show oils which possess exceptional lubricating properties under boundary lubrication conditions are not necessarily best for purposes of film lubrication, and vice-versa; in search for a lubricant which will enable a machine to be run at really high temperatures and at high efficiency it is not only chemistry of lubricant, but its physical properties, which must be studied.

M

MACHINE DESIGN

Metal Industries. Machine Design in the Metal Industries, L. T. Rutledge. Can. Machy. & Mfg. News, vol. 38, no. 13, Aug. 25, 1927, pp. 22–23. A definition and a sketch of the history, progress, methods and aims of machine design, as well as a discussion of the accuracy essential in proportioning the several members of a machine. See also no. 9, Sept. 1, 1927, pp. 18–19.

MACHINE-TOOL INDUSTRY

Historical Review. The American Machine Tool Industry, E. Oberg. Machy. (N. Y.), vol. 34, no. 1, Sept., 1927, pp. 43–47, 2 figs. A brief historical review of the development of a basic industry.

MACHINE TOOLS

Accuracy in Manufacture. Gas Furnaces and Instrument Control Produce Quality Tools, F. W. England. Mfg. Industries, vol. 14, no. 3, Sept., 1927, p. 175, 4 figs. Development of specialized machinery and elaborate methods for producing and maintaining accuracy in manufacture, and instruments for testing this accuracy, with special reference to products of Illinois Tool Works.

Cost-Reducing Aspects. Modern Machine Tools. Machy. (Lond.), vol. 29, nos. 753 and 754, Mar. 17 and 24, 1927, pp. 761–775, and 801–804, 45 figs. Their relation to cost-production problems. Mar. 17: Presents figures indicating type and number of machines required to produce given part, rate at which it was produced by previous methods, and compares these with corresponding data obtained from production with new equipment. Mar. 24: Boring Diesel engine connecting rods; applications of portable radial drill; production of gas burners; machining gas engine beds; production of buffer casings.

Germany, 1927. Machine Tool Exhibit of 1927 (Werkzeugmaschinenschau 1927), O. Schmitz. Maschinebau, vol. 6, no. 15, Aug. 4, 1927, pp. 745–754, 24 figs. Review of 1927 Leipzig Fair show of German machines, including descriptions of recent lubrication systems for gearings, push-button control systems, drilling and boring machines for diameters as large as 4 meters, automatic screw machines, grinding machines with magnetic chucks, etc.

Individual vs. Group Drive. Operation of Machine Tools (Der Antrieb Von Werkzeugmaschinen), O. Pollok. Werkstattstechnik, vol. 21, no. 14, July 15, 1927, pp. 409–416, 22 figs. Comparative study of individual and group drive with respect to efficiency, capital investment and working time.

New. New Shop Equipment at the Expositions. Machy. (N. Y.), vol. 34, no. 1, Sept. 1927, pp. 5–40H, 98 figs. Brief description of new machine tools of all types exhibited at Cleveland and New Haven Shows.

Shop Equipment News. Am. Mach., vol. 67, no. 10, Sept. 8, 1927, pp. 377–414, 90 figs. Brief descriptions of new machine tools of all types exhibited at Cleveland and Detroit expositions.

Scarfing Machines. A Special Plate Corner and Butt Strap Scarfing Machine. Brit. Machine Tool Eng., vol. 4, no. 46, July–Aug. 1927, pp. 635–637, 3 figs. Specially designed by Butler Machine Tool Co., for milling scarfs on both corners of plates used in various kinds of constructional work and also for scarfing butt straps.

Shipyard. Modern Shipyard Machinery, F. Puppe. Eng. Progress, vol. 8, no. 8, Aug. 1927, pp. 205–208, 10 figs. Plate straightening machines; plate shears; revolving horizontal and vertical hole punching machines; three-roll plate bending machines for medium-sized ships.

MACHINING METHODS

Spiral-Gear Bracket. Machining a Spiral Gear Bracket, Mech. World, vol. 82, no. 120, Aug. 19, 1927, p. 132, 4 figs. The operations and jigs required for the machining of a spiral-gear bracket in quantity.

Steam Condensers. Machine Work in a Southern Plant. West. Machy. World, vol. 18, no. 8, Aug. 1927, pp. 388–390, 5 figs. Some machine work on steam condensers.

MACHINERY

Olympia Exhibition. The Shipping, Engineering and Machinery Exhibition at Olympia. Engineering, vol. 124, nos. 3217, 3218 and 3219, Sept. 9, 16 and 23, 1927, pp. 315–325, 352–360 and 386–394, 10 figs. Descriptions of outstanding exhibits and comments on recent developments and improvements.

MANGANESE STEEL

Properties. Properties of Manganese Steel, J. H. Hall. Can. Machy. & Mfg. News, vol. 38, no. 14, Sept. 1, 1927, pp. 20–21. Outlines history manufacture, use, and peculiarities of manganese steel, and at the same time explains some of the problems that were overcome to make it commercially profitable.

MATERIALS HANDLING

Chevrolet Plant. "For Economical Transportation," W. S. Knuksen. Indus. Mgmt. (N. Y.), vol. 74, no. 2, Aug. 1927, pp. 65–68, 18 figs. How the Chevrolet motor company applies its own slogan to production.

Cost Reduction. Cutting Your Handling Costs, G. E. Hagemann. Mfg. Industries, vol. 14, no. 1, July 1927, pp. 19–22, 6 figs. Summarizes factors governing materials handling in individual plants, large or small, new or old, to arrange useful and practical information and data gathered from many sources so that it can be logically analyzed and clearly understood, and to supply facts and figures from experience that can be directly applied to reorganize methods and effect big economies.

Getting the Most Out of the Plant Material Handling System, G. E. Hagemann. Mfg. Industries, vol. 14, no. 3, Sept., 1927, pp. 207–210, 6 figs. Doubling use factor and return on investment; cuts cost of production.

New Shop Cuts Handling Cost Two-Thirds, J. N. Willys. Mfg. Industries, vol. 14, no. 3, Sept. 1927, pp. 197–202, 14 figs. Straight-line mass production, minimum travel of materials, up-to-date handling devices, and best in forging and heat-treating apparatus make new Willy-Overland forge shop unequalled in size and efficiency.

Dumping Conveyors. Progress in Dumping Conveyors (Die Entwicklung der Absetztechnik), Voigt. Braunkohle, vol. 26, no. 21, Aug. 20, 1927, pp. 453–474, 75 figs. Describes recent German systems and makes of continuous conveyors, booms, cranes, trimmers, distributors, etc., especially adapted for transportation and deposition of granular materials in piles, banks and fills; weights, costs, and performance of such equipment.

Foundries. What Mechanical Handling Means to Foundry Profits, P. Cuno. Indus. Mgmt. (N. Y.), vol. 74, no. 2, Aug. 1927, pp. 74–79, 11 figs. Savings and increased production accomplished by use of materials handling equipment.

Production Factor. Handling a Factor in Production, F. L. Eidmann. Can. Machy. & Mfg. News, vol. 38, nos. 13 and 14, Aug. 25, and Sept. 1, 1927, pp. 21–22 and p. 22. Materials handling, which few years ago was not regarded as much of a factor in production, has now reached the stage where it is one of the primary considerations in plant design.

Sand. Sand Handling Mechanized, H. M. Lane. Iron Age, vol. 120, no. 8, Aug. 25, 1927, pp. 461–465, 9 figs. New storage and mixing department at Packard Foundry saves labor and protects sand from the weather.

Steel Industry. Keeping the Steel Industry Supplied with Raw Materials, L. S. Mounoe. Indus. Mgmt. (N. Y.), vol. 74, no. 2, Aug. 1927, pp. 112–117, 20 figs. How coal, iron ore and limestone are handled in bulk.

Warehouse. "Doing It Mechanically," in a Thirteen-Story Wholesale Hardware Building, L. I. Thomas. Indus. Mgmt. (N. Y.), vol. 74, no. 2, Aug. 1927, pp. 85–88, 11 figs. Where modern handling methods are applied to both office and warehouse.

MATERIALS TESTING

Interpretation of. General Meaning of Tests of Materials (Die allgemeine Bedeutung der Werkstoffprüfung), W. Schmidt. V.D.I. Zeit., vol. 71, no. 32, Aug. 6, 1927, pp. 1123–1128, 14 figs. Bearing of tensile strength tests on study of structure of matter; effect of temperature and pressure on tensile strength of metals and viscosity of lubricating oils.

MEASUREMENTS

Length, by Light Interference. Measuring Length by Means of Light Interference (Uber die Längenmessung mit Hilfe der Lichtinterferenz), V. Väisälä. Zeit. für Instrumentenkunde, no. 8, Aug. 1927, pp. 398–402, 2 figs. Description of quartz-meter apparatus and methods used at the University of Turku, Finland, in measuring a distance of about 24 m. with error not exceeding 1 in 10,000,000.

MECHANISMS

Automatic Coil Winder. Automatic Coil-Winding Machines. Machy. (Lond.), vol. 30, no. 776, Aug. 25, 1927, pp. 649–651, 2 figs. Description of a coil winding mechanism which has automatic feature of stopping for taps, at end of coil, if wire should break, and when wire supply spool is empty.

Relieving Mechanism. Formed Cutter Relieving Mechanism, H. C. Town. Machy. (N. Y.), vol. 34, no. 1, Sept. 1927, pp. 62–64, 3 figs. The relieving mechanism described operates by moving the cutter toward and away from the relieving tool, the latter remaining stationary except for a slight feeding movement after each cutter revolution.

METAL SPRAYING

Acetylene. The Practice of Metal Spraying with Reference to Use of Acetylene (Das metallspritzverfahren in der praxis unter berücksichtigung der verwendung von acetylen), Löwenstein. Acetylen in Wissenschaft u. Industrie, vol. 30, no. 7, July 1927, pp. 57–63, 11 figs. Description of metal spraying apparatus and processes, including centrifugal method; present applications and future prospects; expects great increase in consumption of acetylene; electric metal spraying not successful, nor is it suitable for purposes of process.

METALLOGRAPHY

Polishing and Etching. A Metallographic Polishing Machine, O. E. Romig and J. C. Whetzel. Am. Soc. for Steel Treat.—Trans., vol. 12, no. 2, Aug. 1927, pp. 235–238, 1 fig. Available metallographic polishing machines were studied and many were tried, but there were disadvantages of slippage of belts and friction disks, excessive noise and vibration, all of which increased difficulty of polishing specimens; it was decided to construct a polishing machine free from these defects and one that would have sufficient power to polish large specimens such as those used for macro examination; horizontal disk type was decided on and machine of this type was built according to ideas of authors; resulting machine was very smooth running and gave very good results.

Polishing and Etching Lead, Tin, and Some of Their Alloys for Microscopic Examination, J. R. Vilella and D. Beregekoff. Indus. & Eng. Chem., vol. 19, no. 9, Sept. 1927, pp. 1049–1052, 16 figs. This work forms part of a series of investigations on improved methods

of polishing and etching conducted at the Union Carbide and Carbon Research Laboratories, Inc.; in addition to present contribution, this investigation has resulted in development of method of polishing steel which does not drag out non-metallic inclusions; also in improved methods for polishing and etching iron-chromium alloys, copper and its alloys, and aluminum and its light alloys.

METALS

Machinability. Machinability of Metals, O. W. Boston. Am. Soc. for Steel Treat.—Advance Paper, no. 6, for mtg. Sept. 19 to 23, 1927, 39 pp., 28 figs. This paper gives outline of various methods which are being used to designate machinability of metals, and gives under heading of each method outline of work done by various authors as published in few outstanding papers on subject.

Temperature Effect on. Effect of Temperature on the Properties of Metals. Mech. Eng., vol. 49, no. 10, Oct. 1927, pp. 1111–1114, 9 figs. Progress report of joint research committee organized by the Am. Soc. of Mech. Engrs. and the Am. Soc. for Testing Materials; results of tests on thermal expansion of four classes of steel; comparative high-temperature tension tests on a carbon steel and on a chromium-molybdenum steel.

Wear Testing of. Wear Testing of Metals, H. J. French. Engineering, vol. 124, no. 3215, Aug. 26, 1927, pp. 279–280. Paper presented at the annual meeting of the Am. Soc. for Testing Materials, French Lick, Ind., U. S. A., June 20–24, 1927. Abridged.

MILLING MACHINES

"Adapta." Parkinson "Adapta" Milling Machines. Brit. Machine Tool Eng., vol. 4, no. 46, July-Aug. 1927, pp. 620–624, 10 figs. Its wide range of adaptability, and facility with which cutter can be presented at various angles make "Adapta" milling machine extremely useful for tool and die work, experimental work, pattern shop, and for model making as well as for many operations in ordinary workshop production.

MOLDING METHODS

Runners, Risers, and Gates. Runners, Risers, and Gates, J. Butterworth. Mech. World, vol. 82, nos. 2120 and 2121, Aug. 19 and 26, 1927, pp. 137–138 and 148. Round or square runners; applications to different castings.

MOLDING MACHINES

Hand. Progress in Molding Machine Construction in Germany (Fortschritte im deutschen Formmaschinenbau, U. Lohse. Giesserei, vol. 14, no. 29, July 16, 1927, pp. 493–499, 15 figs. Drawings and description of portable hand-operated molding presses with fixed or movable cross beams.

MOTOR BUSES

Differential Gears. The Case for a Differential Gear Between Axles in Six Wheelers, P. M. Heldt. Automotive Industries, vol. 57, no. 7, Aug. 13, 1927, pp. 230–231, 2 figs. Differential between driving axles seems justified only for vehicles that are driven usually on smooth pavements at moderate speeds.

Electric Drive. The Electric Drive as a Motorcoach Transmission, C. Froesch. Soc. of Automotive Engrs.—Jl., vol. 21, no. 3, Sept., 1927, pp. 268–276, 14 figs. Engineering factors involved in adaptation of electric drive to motor buses; advantages and disadvantages discussed.

Graham. New Six-Cylinder Graham Bus Has Four-Speed Transmission. Automotive Industries, vol. 57, no. 13, Sept. 24, 1927, p. 445, 2 figs. In addition to the six-cylinder engine, a four-speed transmission, hydraulic four-wheel brakes, cam and lever steering gear, and a new type of rear spring design feature the new models; higher speed and generally improved performance have been the main objectives in the new design, while comfort has been given attention in better distribution of weight and new type of seat design.

Michigan. The Auto-Bus as a Common Carrier in Michigan, W. W. Hitchcock. Mich. Eng. Experiment Sta.—Bul., no. 12, July 1927, 9 pp. Historical data presented showing rapid growth of industry and detailed record of operation of licensed buses in Michigan for 1925 is given to show the magnitude which industry has reached; study made of cost of maintaining highways over which these buses operate and comparison made between cost of maintenance of highway with tax paid by buses which operate over it.

Operation Costs. Know Your Costs, F. D. Howell. Bus Transportation, vol. 6, no. 9, Sept. 1927, pp. 497–499. Absolute necessity for continuous and careful analysis of financial records by all motor carrier managers, and for policies and practice of management.

Safety in Operation. Operating the Motor Bus Safely, F. S. Hobbs. Ry. Age, vol. 83, no. 9, Aug. 27, 1927, pp. 425–426. Problem one of education not only of bus drivers but entire public; importance of railroad training.

MOTOR-TRUCK TRANSPORTATION

South Africa. Road Motor Transport in South Africa, J. D. White. Ry. Gazette, vol. 47, no. 10, Sept. 2, 1927, pp. 287–290. Since 1912 when first service was introduced road motor transport has developed until services under control of South African Government Railways and Harbours administration are now operating over 4000 route-miles of road.

Water Terminal Traffic, Relation to. Design of Shipping Terminals for Accomodation of Truck and Rail Traffic, G. F. Nicholson. Pac. Mar. Rev., vol. 24, no. 9, Sept., 1927, pp. 413–415. Motor truck has become important and permanent factor in concentration and distribution of cargo for Pacific Coast ports. Statistics for recent years indicate probable increase in truck traffic; terminal design.

MOTOR TRUCKS

Freight-Handling. Trucks Handle Freight on B. & O. Ry. Age, vol. 83, no. 9, Aug. 27, 1927, pp. 407–408, 5 figs. B. & O. saves approximately $1000 monthly in Baltimore-Washington district.

Graham. New Graham Truck Has "Six" Engine, Four-Speed Transmission, A. F. Denham. Automotive Industries, vol. 87, no. 8, Aug. 20, 1927, pp. 257–258, 2 figs. Four-wheel hydraulic brakes also offered on new 2-ton model; same type brakes and transmission adopted for $1^1/_2$-ton job; cam and lever steering.

Six-Wheeled. The Foden Rigid Six-Wheeler. Motor Transport, vol. 45, no. 1170, Aug. 15, 1927, pp. 197–198, 5 figs. Compensated suspension of rear bogie, but only the leading axle driven; a heavy haulage unit for economical bulk transport.

Trailers. Tractors and Trailers Transfer L.c.l. Freight at Oakland. Ry. Age, vol. 83, no. 9, Aug. 27, 1927, pp. 419–421, 5 figs. Drayage Service Corporation operates over 100 units under contracts with S.P., A.T. & S.F., and W.P.

Vibrations Caused by. Earth Vibrations Caused by Motor Vehicles, E. Essers and T. Kappes. Eng. Progress, vol. 8, no. 8, Aug. 1927, pp. 221–222, 4 figs. A communication from the Laboratory for Automotive Engineering and the Seismological Institute of the Technical University at Aachen.

MOTORCYCLES

Brakes. New Motorcycle Features Include "Fore-Wheel" Brakes. Automotive Industries, vol. 87, no. 7, Aug. 1927, p. 269. Harley-Davidson and Indian announce 1928 lines with many improvements; former introduces throttle-controlled motor lubrication while latter has new frame and other changes.

O

OIL ENGINES

Fiat. A 2000 B.H.P. Single-Cylinder Experimental Oil Engine. Engineer, vol. 144, no. 3738, Sept. 2, 1927, p. 261, 2 figs. Describes 2000 b.hp. single-cylinder two-stroke double-acting marine oil engine built by Fiat Stabilimento Grandi Motori, Turin.

Ice Plants. Oil Engine Drive for Ice-Making Plants, R. C. Wallace. Cold Storage, vol. 30, no. 353, Aug. 18, 1927, pp. 261–262. Operating costs compared with steam and electricity.

Injection Valves. Factors in the Design of Centrifugal Type Injection Valves for Oil Engines, W. F. Joachim and E. G. Beardsley. Nat. Advisory Committee for Areonautics, no. 268, Aug. 1927, 15 pp., 22 figs. Research undertaken at the Langley Memorial Aeronautical Laboratory, at Langley Field, Va., in connection with general study of application of fuel-injection engine to aircraft; purpose of investigation was to determine effect of four important factors in the design of a centrifugal type automatic injection valve on penetration, general shape, and distribution of oil sprays.

OIL FUEL

Outlook for. The Outlook for Fuel Oil, G. H. Ashley. Combustion, vol. 17, no. 3, Sept. 1927, pp. 163–164. It may be anticipated, that within relatively few years, probably within ten years at the outside, production will begin to fall behind demand, and will do so much more rapidly than old estimates had anticipated; for a time, with higher selling prices, needs of this country will be met by importation from South America, and possibly elsewhere; ultimately, and before many years, however, we will turn to oil artificially produced.

ORDNANCE

Anti-Friction Bearings. Anti-Friction Bearings in Ordnance Work, F. Brauer. Mech. Eng., vol. 49, no. 9, Sept. 1927, pp. 959–965, 14 figs. Rapid and easy manipulation of heavy ordnance made possible by the use of ball and roller bearings; some designs for heavy-load conditions.

OXYACETYLENE WELDING

Airplane Fuselage. Gas Welded Fuselage Construction, N. Damours. Welding Engr., vol. 12, no. 8, Aug. 1927, pp. 34–36, 6 figs. Strong joints obtained with oxyacetylene torch act as a protection to passengers when engine trouble develops.

P

PAINTS

Aluminum. Protecting Wood with Aluminum Paint, J. D. Edwards and R. I. Wray. Indus. & Eng. Chem., vol. 19, no. 9, Sept. 1927, pp. 975–977. Data are presented in confirmation of conclusions of Dunlap and Browne that paint coatings co nue to protect wood adequately against weathering only so long as they maintain a reasonable degree of moisture-excluding efficiency, as measured by Dunlap method; data indicate further that coatings having a moisture-excluding efficiency still higher than the traditional house paints afford materially greater protection against wood weathering; aluminum paints or coatings made up of priming coat of aluminum paint covered by ordinary house paints are highly impermeable to moisture, especially effective in preventing wood weathering, and very durable.

Testing Durability of. A Principle for Testing the Durability of Paints as Protective Coatings for Wood, F. L. Browne. Indus. & Eng. Chem., vol. 19, no. 9, Sept. 1927, pp. 982–985, 3 figs. Purpose of this paper is to set forth the basic principle of a technic for measuring, independently of the personal bias of the operator, the degree of protection afforded by paint coatings against the weathering of wood and the change in their protective power as the coatings themselves deteriorate during exposure.

PIPE LINES

Steel, Ox-Welding. Ox-Welding of Steel Pipe Lines, S. W. Miller. Can. Machy. & Mfg. News, vol. 38, no. 14, Sept. 1, 1927, pp. 25–27. While some of earliest welding in production was the joining of steel and wrought iron pipe, such use of this tool has grown tremendously in recent years, as the oxwelded line presents economies hitherto unavailable.

PIPES, STEEL

Reinforced. Recent Results in Construction of Pressure Conduits (Alcuni recenti risultati nella costruzione delle condotte forzate). Elettrotecnica, vol. 14, no. 22, Aug. 5, 1927, pp. 517–519, 6 figs. Describes recent reinforced steel pipes 1.065 m. to 2.5 m. in diameter designed for pressures as high as 142 atmospheres.

Welded. Suggests Annealing for Welded Pipe, J. L. Avis. Iron Age, vol. 120, no. 8, Aug. 25, 1927, pp. 474–476, 9 figs. Tests on water supply pipe show weakness in zone alongside joint, having grain coarsened by welding heat; treatment of plates in manufacture.

PLATES

Circular, Ribbed. Circular Plates with Beaded Central Hole and Radial Ribs (Kreisplatte mit Rippenstern), M. Schilhansl. V.D.I. Zeit., vol. 71, no. 33, Aug. 13, 1927, pp. 1154–1156, 14 figs. Mathematical analysis of such plates and its value in design of adjustment plates of thrust bearings, turbine housings, locomotive cylinders, etc.; comparison of results obtained by rigorous and approximate solutions.

POWER PLANTS

Accidents. The Factory Inspector's Report. Elecn., vol. 99, nos. 2566 and 2567, Aug. 5 and 12, 1927, p. 170 and 199. Aug 5: Power station dangers; accidents fewer than last year; safety measures often ignored. Aug. 12: Electric drill and hand lamps; shock from a.c. at low pressure; fatal accidents in 1926.

Diesel-Engine Standby. Solving the Peak Load Problem. Can. Engr., vol. 53, no. 9, Aug. 30, 1927, pp. 261–262, 3 figs. Diesel engines for standby purposes in water works and electric lighting plants; itemized cost of operating 500-hp. and 1000-hp. Diesel units; four-cycle engines of solid injection type.

PRESSWORK

Increasing Output. Increasing Output with the Power Press, D. M. Duncan. Can. Machy. & Mfg. News, vol. 38, no. 7, Aug. 18, 1927, pp. 13–16, 5 figs. More common types of power presses are discussed in relation to mass production of sheet-metal parts, including importance of efficiency of dies and suitability of materials.

PULVERIZED COAL

Holbeck System for Burning. Plant Efficiency Forty Percent Greater. Black Diamond, vol. 79, no. 10, Sept. 3, 1927, pp. 14–15, 3 figs. Auto specialties company of Benton Harbor, Mich., increases capacity of furnaces and annealers by installing Holbeck system for burning pulverized coal.

Unit System. The Unit System for Pulverized Coal Burning, S. C. Martin. Indus. Mgmt. (N. Y.), vol. 74, no. 3, Sept. 1927, pp. 151–156, 11 figs. Discusses principles of operation and details of design of unit system, with view to giving industrial executive better knowledge of its possibilities as applied to his own power problem.

Use in Plate Mills. Powdered Coal for Plate Mills, R. H. Irons. Iron Age, vol. 120, no. 8, Aug. 25, 1927, pp. 469–472, 5 figs. Transport line 1200 ft. long; substantial reduction in heating costs for varying types of furnaces.

PUMPING STATIONS

Types for the Future. Future Pumping Stations—What Type?, A. L. Mullergren. Water Wks. Eng., vol. 80, no. 17, Aug. 17, 1927, pp. 1189–1190 and 1214. Tendency to change in design; influence of steam turbine on the larger station; electricity will be used largely in smaller units.

PUMPS

Air-Lift. The Design of Air Lifts for Water, A. L. Egan. S. African Min. & Eng. Jl., vol. 37, no. 1841 and 1845, Jan. 8 and Feb. 5, 1927, pp. 521–523 and 623–624, 4 figs. Design of air lift to pump 700,000 gal. per hour from depth of 225 ft. at altitude of 4000 ft.

Non-Clog. Non-Clog Centrifugal Pump. Engineering, vol. 124, no. 3214, Aug. 19, 1927, p. 234, 5 figs. Description of a non-clog centrifugal pump made by the Rees-Roturbo Manufacturing Co., Ltd., Wolverhampton.

Tangential. Use and Production of Tangential Pumps, D. M. Duncan. Power House, vol. 21, no. 17, Sept. 5, 1927, pp. 19–20, 3 figs. Fields of reciprocating and centrifugal pumps are compared and intermediate position held by tangential pump indicated in handling small volumes at high pressure.

PUMPS, CENTRIFUGAL

Automatic Starting. Automatic Starting of Centrifugal Pumps, C. N. McDavitt. Power, vol. 66, no. 8, Aug. 23, 1927, pp. 274–277, 4 figs. A system for the automatic priming and starting of centrifugal pumps that allows them to be operated safely without

an attendant, when located above the intake water level.

PYROMETERS

Tests. Pyrometric Methods for Ovens Fired with Small-Coal (Die Messung hoher Temperaturen an Kohlegriessöfen), W. Miehr. Tonindustrie-Zeitung, vol. 51, no. 60, July 27, 1927, pp. 1063–1068, 7 figs. Comparative experimental study of Hirsch and Miehr methods of measuring heat with hot wire pyrometers; found Hirsch method preferable; ± 5 per cent range in determinations, radiation pyrometers thought to be more suitable for ovens fired with small coal.

PYROMETRY

Thermocouples. The Measurement of High Temperatures by Thermo-couples. Metallurgist (Supp. to Engr.), Aug. 1927, pp. 119–121. From an article by Wenzl and Morawe in Stahl u. Eisen, May 26, 1927, p. 867 and one by Dr. W. Rohn in Zeit. für Metallkunde, Apr. 1927, p. 138.

R

RADIATORS

Production Methods. Stepping Up Production Mechanically, P. Dwyer. Foundry, vol. 55, nos. 14, 15, and 16, July 15, Aug. 1 and 15, 1927, pp. 550–554, 588, 592, and 635–638, 14 figs. Describes methods and equipment employed at Buffalo plant of Am. Radiator Co. July 15: Removing chance from core-making. Aug. 1: How molds are made, handled and poured. Aug. 15: Methods and equipment employed for handling castings between shakeout and shipping platforms.

RAILS

Failures of. A Diagnosis of Rail Failures, T. H. Symington, Ry. Age, vol. 83, no. 9, Aug. 27, 1927, pp. 383–385, 2 figs. Freight-car truck springs going solid on both curves and straight track suggested as a cause.

Hair Cracks in. Hair Cracks in Steel Rails, J. H. Whiteley. Am. Soc. for Steel Treat.—Trans., vol. 12, no. 2, Aug. 1927, pp. 208–215 and (discussion) 215–220 and 234, 13 figs. This paper sets forth various tests made to detect internal flaws or defects in steel rails frequently described as hair cracks; two methods were employed, magnetization and treatment with dust in kerosene, and effect of reagent; chief features of interest which were revealed by microscopic examination are enumerated.

News Section. The Reading Adopts A New Rail Section, J. C. Wrenshall. Ry. Eng. & Maintenance, vol. 23, no. 9, Sept. 1927, pp. 369–371, 7 figs. Modified head with head-free joints shows marked advantages over common pattern.

RAILWAY ELECTRIFICATION

Great Northern Railway. Electrification on the Great Northern. Pub. Service Mgmt., vol. 43, no. 3, Sept. 1927, pp. 84–86, 2 figs. New motive power supplanting steam now under way will work great transformations in the West; longest tunnel in America through cascades.

RAILWAY MOTOR CARS

Canadian National Railways. Operation of Motor Coaches on Canadian National Railways, H. C. Rochester. St. Louis Ry. Club—Official Proc., vol. 32, no. 3, July 1927, pp. 27–35. Experiences of the Canadian National Railways with various types of motor coaches.

D., T. & I. Recent Electric and Petrol-Electric Locomotive Developments in America. Tramway & Railway World, vol. 61, no. 24, May 12, 1927, pp. 233–237, 8 figs. Description of Westinghouse electric locomotive for Great Northern; and motor car for the Detroit, Toledo and Ironton.

Oil-Electric. Canadian National Railways Oil Electric Cars. Ry. & Locomotive Eng., vol. 11, no. 8, Aug. 1927, pp. 223–224, 1 fig. Built at railroad company's shops and equipped with Beardmore engines.

Steam. The Development of the Steam Rail Motor Car. Ry. Gaz., vol. 47, no. 8, Aug. 19, 1927, pp. 225–230, 9 figs. New cars, designed and built by Clayton Wagons Limited, of Lincoln, for service on the London & North Eastern and Egyptian State Railways.

RAILWAY OPERATION

Cost Accounting. Cost Accounting and the Operation Expense Classification, C. E. Parks. Ry. Age, vol. 72, no. 8, Aug. 20, 1927, pp. 339–341. Defines cost accounting, groups costs, gives results of cost accounting, and discusses the elements of cost in railway operations.

Track Circuits. Influence of Bonded Rail Resistance on Track Circuit Safety, J. B. Weigel. Ry. Signaling, vol. 20, no. 9, Sept. 1927, pp. 341–347, 10 figs. Study of effect of welded bonds on train shunt and broken rail protection using curves to illustrate graphically features of track circuit operation.

Train Control. Train Indication System Installed by Brooklyn-Manhattan Transit, A. A. Roberts. Ry. Signaling, vol. 20, no. 9, Sept. 1927, pp. 336–338. New spotlight train indicator of improved design recently placed in service provides chief dispatcher's office with accurate visual information on location and movement of all trains within central and most congested portions of system; such information was heretofore available only by telephone communication.

RAILWAY REPAIR SHOPS

Equipment Passenger Truck Work Facilitated. Ry. Mech. Engr., vol. 101, no. 9, Sept. 1927, pp. 597–600, 8 figs. Fifteen-ton overhead traveling crane saves time and labor in handling truck repairs; other labor-saving equipment.

London. Overhaul by Conveyor Platform, H. W. Blake. Elec. Ry. Jl., vol. 70, no. 8, Aug. 20, 1927, pp. 303–308, 8 figs. European electric railways adopt Henry Ford's construction methods in overhaul of their equipment; entire shop based on this principle designed by the London Underground Electric Railway.

Safety in. Safety in the Repair Shop, L. J. King. Aera, vol. 18, no. 2, Sept. 1927, pp. 195–199, 5 figs. Brief summary of means employed by Pittsburgh Railways Company to prevent accidents among employees in its shops.

RAILWAY SHOPS

Cranes. Alternating Current for Cranes and Turntables. Ry. Elec. Engr., vol. 18, no. 9, Sept. 1927, pp. 277–281. An installation of a.c. cranes which have now long given dependable service on an eastern railroad provides dependable operation with low maintenance; 24 man-hours per month cares for 5 shop cranes.

Machine Tools. Some Railroad Shop Tools. West Machy. World, vol. 18, no. 8, Aug. 1927, pp. 380–382, 6 figs. Boring mill and planer operations on locomotive parts such as connecting rods, shoes and wedges, bearings, etc.

RAILWAY SIGNALING

Automatic Train Control. Automatic Train Control, G. E. Ellis. Pacific Ry. Club—Proc., vol. 11, no. 4, July 1927, pp. 3–36. Development of train control; plain stop and speed control; cab signals; specifications and requirements for automatic train-stop or train-control devices.

Train-Dispatching System. N.Y.C. Installs First Complete Train Dispatching System, B. J. Schwendt. Ry. Age, vol. 72, no. 8, Aug. 20, 1927, pp. 325–330, 13 figs. Switches power-operated and train movements directed by signal indication without written orders on 40-mile heavy-traffic section of road between Toledo, Ohio, and Berwick on Ohio Central lines. System controlled by dispatcher.

RAILWAY SWITCHES

European Tramways, Statistics. Use of Automatic and Remote Control Switching (Emploi d'aiguillages automatiques ou d'aiguillages commandes à distance), P. Bataille and K. Stoffels. L'Industrie des Voies Ferrees et des Transports Automobiles, vol. 21, no. 247, July 1927, pp. 347–351, 1 fig. Statistical summary of European tramway usage, including data on street-car accidents, and discussion of cost; paper written on basis of answers to questionnaire, presented at International Congress of 1926 in Barcelona.

RAILWAY TRACK

Maintenance. Renewal of Permanent Way. A. W. Bretland. Instn. Civ. Engrs. of Ireland—Trans., vol. 52, 1927, pp. 83–99, 7 figs. Brief description of new method of replacing railway track which, except for opening out and packing of track, and setting down and taking up of assembled track by power, concentrates all work formerly done on line in central depot equipped with electric power, and work is done under shop conditions.

Ties. Urges Broad Study of Steel Ties. Iron Age, vol. 120, no. 9, Sept. 1, 1927, pp. 559–560. Large outlet for steel in the early making, writer contends, if question is tackled by industry properly as sales-engineering-research job.

REFRACTORIES

Boiler-Furnace. Refractories Service Conditions in a Furnace Burning Pittsburgh Coal on Underfeed Stokers, R. A. Sherman and W. E. Rice. Mech. Eng., vol. 49, no. 10, Oct. 1927, pp. 1085–1092, 13 figs. Progress report of the A.S.M.E. special research committee on boiler-furnace refractories; presents data which pertain to furnace conditions that affect life of refractories in furnaces burning coals from the Pittsburgh No. 8 bed on underfeed stokers; investigation was conducted at the Lowellville, Ohio, station of the Pennsylvania-Ohio Power and Light Co.

REFRIGERATING MACHINES

Absorption. Economy of New Types of Absorption Refrigerators (Wirtschaftlichkeit und neue Formen der Absorptions-Kältemaschine), E. Wirth. Schweizerische Bauzeitung, vol. 90, no. 7, Aug. 13, 1927, pp. 83–86, 12 figs. Theory of liquid ammonia absorption refrigerators, principles of their construction; heat balance; review of recent patents; the great future of domestic refrigerators.

French. The Refrigerating Industry (L'Industrie Frigorifique), R. Billardson. Compte Rendu des Travaux de la Société des Ingenieurs Civils de France—Memoires, vol. 80, nos. 3 and 4, Mar.-Apr. 1927, pp. 457–528, 23 figs. Full but rather elementary discussion of principles of refrigeration and modern refrigerating processes and machinery; contains description of several types, among them Follain water vapor machine, and the Corblin steel membrane compressor.

Gas. Refrigeration by Direct Application of Heat, H. E. Keeler. Gas Industry, vol. 21, no. 8, Aug. 1927, pp. 275–279. Description of the principles of the household refrigerating machine operated by gas.

Lubrication. Lubrication of Refrigerating Machinery, R. Haskell. Refrig. World, vol. 62, no. 8, Aug. 1927, pp. 23–25. Paper presented by author before New York Chapter No. 2, National Association of Practical Refrigerating Engineers.

REFRIGERATING PLANTS

Eletrically Driven. Electrically-Driven Refrigerating Plants. Electricity, vol. 41, no. 1919, Aug. 19, 1927, pp. 581–582. Types of motors used.

REFRIGERATION

Piping in Ice Tanks. Amount of $1^1/_4$ Inch Piping for Ice Tanks, W. H. Motz. Refrigeration, vol. 42, no. 2, Aug. 1927, pp. 46–47, 2 figs. Effects of heat transfer rates, brine temperatures and ammonia temperatures, together with initial water temperature; data shown by a graphical chart; high heat-transfer rates obtained in new arrangement.

REFRIGERATORS

Household. Specifications for Household Refrigerators. Ice & Refrigeration, vol. 73, no. 3, Sept. 1927, pp. 137–139. Tentative general suggestions and specifications covering design and construction of refrigerators; main points to consider; the ice compartment most important; ice compartment ratio; insulation; air circulation, sanitary exterior and interior, material and workmanship, etc.

ROLLING MILLS

Cold Rolling, Cost Reduction. Reducing Production Costs in Cold Rolling Mills (Verminderung der Erzeugungskosten im Kaltwalzwerksbetrieb), H. Noleppa. Stahl u. Eisen, vol. 47, no. 32, Aug. 11, 1927, pp. 1317–1323, 5 figs. Operation and cost analyses and more or less specific remarks showing how by standardization, modern industrial management, improvements, introduction of new machinery, purchasing pig iron by new specifications, etc., the duration of the rolling process can be cut in half and costs correspondingly reduced.

Rod. Rod Rolling and Wire Drawing, J. P. Bedson and J. S. G. Primrose. West of Scotland Iron & Steel Inst.—Jl., vol. 34, no. 4, Feb. 1927, pp. 52–58 and (discussion) 58–62, 8 figs. Historical; modern methods; layout of plant; continuous rod mills; cleaning; annealing; patenting; galvanizing; wire drawing; testing.

Thin Sheet. Rolling Thin Sheets, W. Krämer. Iron & Coal Trades Rev., vol. 115, nos. 3099, 3100, 3101, and 3102, July 22, 29, Aug. 5 and 12, 1927, pp. 126–127, 164–165, 200–201 and 230–231, 32 figs. Notes on Continental practice, giving information concerning existing plants and processes, and touching upon some important innovations during recent years. Offers suggestions for further improvements.

RUBBER

Strength of. Influence of Temperature on the Tensile Strength of Reclaimed Rubber, H. F. Palmer. Indus. & Eng. Chem., vol. 19, no. 9, Sept. 1927, pp. 1030–1033, 6 figs. Effect of the temperature of the test strips and surrounding atmosphere during test upon resulting tensile of vulcanized reclaimed rubber mixtures is quite marked; tensile, stress, and elongation decrease with rise in temperature.

Use as Engineering Material. Rubber as a Material for Mechanical Engineering, W. A. Gibbons. Soc. of Automotive Engrs.—Jl., vol. 21, no. 3, Sept. 1927, pp. 262–264, 4 figs. Some of the fundamental mechanical and elastic properties of rubber are discussed briefly in comparison with those of steel in hope that, having a better understanding of them, engineers will increasingly consider rubber as a desirable material that is suitable for constructional purposes because of these primary mechanical properties.

S

SAND, MOLDING

Synthetic. Advocates Synthetic Sand, F. C. Scheiber. Foundry, vol. 55 no. 15, Aug. 1, 1927, pp. 612–613. Malleable foundry finds used core sand excellent basis for blended molding mixtures; glycerine preserves moisture.

SAWS

Hot. Hot Saws (Uber Warmsägen), A. Schwarze. Machinenbau, vol. 6, no. 13, July 1927, pp. 657–661, 13 figs. Construction and details of lever, oscillating and other types of saws for cutting structural steel shapes; drive for saw-web and feed.

Metal-Cutting. Development of High Speed Steel Hack Saws or Cutting Off Saws, H. B. Allen. Am. Soc. for Steel Treating—Preprint for 9th Annual Convention, Sept. 19 to 23, 1927, 11 pp., 1 fig. Discusses application of high-speed steel to machine hack-saw blades; description of hardening process brings out some interesting properties of high-speed steel not usually apparent when dealing with customary heavier sections; steel is shown to be plastic for some time after hardening, even when it is above hardness of 62-C Rockwell; neither does it attain full hardness for a considerable time after becoming quite cold; relative performance of saws made of high-speed steel and low-tungsten steel is also shown.

SCREW THREADS

Bolt and Tube Threading Machines. Bolt and Tube Screwing Machines. Machy. (Lond.), vol. 30, no. 774, Aug. 11, 1927, pp. 582–583, 4 figs. Machines built by Kendall & Gent, Ltd., Gorton, Manchester, England.

SEAPLANES

Floats and Hulls. Seaplane Floats and Hulls, H. Herrmann. Nat. Advisory Committee for Aeronautics—Tech. Memorandum, no. 426, Aug. 1927, 29 pp., 32 figs. Seaplanes have been built for the last twelve to fourteen years and enormous experience has been gained; present report is first systematic digest of important technical data available on this subject.

SHAFTS

Torsional Strength of. Torsional Strength of Splined Shafts. Soc. of Automotive Engrs.—Jl., vol. 21, no. 3, Sept. 1927, pp. 222–223, 1 fig. Stresses at inner corners of the keyseat are expressed as ratios of the maximum stresses produced by the same torsional moment in two ordinary tubular shafts with 5.8-in. bore and diameters of 8 and 10-in., respectively; outstanding deduction from this research is that a 0.35-in. radius fillet is required to make the 10-in. diameter splined shaft as strong as a hollow circular shaft of 8-in. diameter.

SHEARS

Power Requirements. New Method for Determining Power Requirements of Warm Saws (Eine neue Methode zur Ermittelung des Kraftbedarfs von Warmsägen), A. Schwarze. Centralblatt der Hütten u. Walzwerke, vol. 31, no. 29, July 20, 1927, pp. 398–404, 10 figs. Theoretical analysis of horsepower required to operate shearing machines used for cutting structural steel shapes, taking into account shearing strength of cut specimen.

SILICON STEEL

Bosshardt Furnace. Silicon Steel by the Bosshardt Furnace (Silizium-Baustahl aus dem Bosshardt-Ofen), K. v. Kerpely. Centralblatt der Hütten u. Walzwerke, vol. 31, no. 27, July 6, 1927, pp. 367–372, 7 figs. Reports results of tests of six samples supervised by State Institute for Testing Materials, showing that, with low carbon and manganese and equal working, new 10-ton Bosshardt furnace yields silicon steel of as good a quality as one from Siemens-Martin furnaces, and that tension elastic limit may be conservatively raised from 36 to 40 kg. per sq. mm.; drawings of Bosshardt furnace.

SMOKE

Density Meter for. A Smoke-Density Meter, F. Sawford. Mech. Eng., vol. 49, no. 9, Sept. 1927, pp. 999-1004, 9 figs. A discussion of the desirability of measuring instruments in the modern boiler room; description of a recently developed meter for the measurement of smoke density, and an explanation of the manner in which such a meter may aid in the abatement of smoke and the improvement of furnace efficiencies.

SMOKE ABATEMENT

Denver. What Denver Is Doing to Abate Smoke, C. B. Roth. Am. City, vol. 37, no. 3, Sept. 1927, pp. 345–347. Intensive campaign carried on in 1925 moves Denver from 37th to 18th place among 150 cities inspected by Government to determine prevalence of smoke.

Salt Lake City. Salt Lake's Smoke and Smokeless Fuel Problem, L. C. Karrick. Salt Lake Min. Rev., vol. 29, no. 9, Aug. 15, 1927, pp. 13–15. Suggest an adequate and permanent source of rich gas, a suitable solid smokeless fuel, and a furnace oil at low prices by installing in Salt Lake a central low-temperature coal-treating plant.

SPRINGS

Automobile. Some Mechanical Features of Suspension Leaf-Springs, T. Franzen, S. P. Hess and C. A. Tea. Soc. of Automotive Engrs.—Jl., vol. 21, no. 3, Sept. 1927, pp. 231–238, 21 figs. Special emphasis is given to some of the principles th underlie design and to the dynamic behavior of springs with particular reference to interleaf friction.

Hairsprings. The Manufacture of Hairsprings, H. Moore and S. Beckinsale. Forging—Stamping—Heat Treating, vol. 13, no. 8, Aug. 1927, pp. 292–294 and 305. Heat-treating methods and their effect on properties of springs receive much consideration; comparison is made between springs of steel and non-ferrous metals.

Railway. Railway Springs. Ry. Engr., vol. 48, nos. 570 and 571, July and August, 1927, pp. 249–250 and 293–295. Aspects of theory, design and construction with special reference to laminated bearing springs for locomotives. Abstract of paper read before Instn. Locomotive Engrs.

STANDARDIZATION

National. National Standardization, L. W. W. Morrow. Elec. World, vol. 90, no. 10, Sept. 3, 1927, pp. 463–465. Functional set-up of organization within the industry to expedite standardization procedure; industry executives must be sold; complete reorganization proposed.

STEAM

High-Pressure. High-Pressure Steam; Its Advantages and Disadvantages, H. Anderson. Elec. Jl., vol. 24, no. 9, Sept. 1927, pp. 426–429, 1 fig. Reviews progress in use of high-pressure steam and its advantages and disadvantages; thermodynamic gains; additional equipment required; operation and maintenance; economic considerations.

STEAM ENGINES

Bearing Lubrication. Bearing Lubrication of Vertical High Speed Steam Engines. Commonwealth Engr., vol. 14, no. 11, June 1, 1927, pp. 433–435, 3 figs. Describes forced-feed circulation system and stresses importance of keeping system and oil clean by giving it daily attention; shows economic advantages of using correct oil.

STEAM POWER PLANTS

Operating Records. How One Plant Handled Its Operating Records, J. J. Neville. Power, vol. 66, no. 10, Sept. 6, 1927, pp. 366–368, 2 figs. Forms used in an industrial plant.

Toronto, Canada. Auxiliary Steam-Electric Power Station and Central Heating Plant. Elec. News, vol. 36, no. 16, Aug. 15, 1927, pp. 31-33, 1 fig. Report submitted by consulting engineers to Toronto hydro-electric commission recommends stand-by system; coking plant not justified at present time.

Unit Coal Pulverizers. Unit Coal Pulverizers for 20,000-Kilowatt Single-Unit Plant, P. A. Vickers. Power, vol. 66, no. 14, Oct. 4, 1927, pp. 504–508, 5 figs. In Kalamazoo steam plant of Consumers Power Co., three 15,360-sq. ft. boilers are each equipped with two unit mills, and water walls with flexible connections to drum; boilers 18 tubes high in main bank and plate type preheaters are preferred to economizers; entire arrangement is unusually simple and compact; auxiliaries are electric-driven and three-stage bleeding to heat feedwater.

STEAM TURBINES

Development. Steam-Turbine Development, W. B. Spellmire. Engrs.' Soc. of West. Penn.—Proc., vol. 43, no. 4, May 1927, pp. 198–210, 10 figs. Discussion based on experience with General Electric Co.; developments at different stations.

Some Notes on Steam Turbine Development, W. J. A. London. Power, vol. 66, nos. 9, 10, 11, 12, 13 and 14, Aug. 30, Sept. 6, 13, 20, 27 and Oct. 4, pp. 322–323, 360–362, 391–396, 433–436, 482–483 and 515–517. Early accomplishments; work of Parsons, Stofola, Hodgkinson, Emmet and De Laval. Sept. 6: Development of proper design of turbine casings. Sept. 13: Blade proportions; adoption of double-flow principle; other points of design. Sept. 20: Some modern developments in design of smaller details, such as casing feet, piping and exhaust connections. Sept. 27: Designs of bearings and bearing housings. Oct. 4: Many developments in other lines of engineering and industrial activity which had distinct bearing on progress of steam-turbine design.

Supersaturated Steam in. Supersaturation and the Flow of Wet Steam, G. A. Goodenough. Power, vol. 66, nos. 13 and 14, Sept. 27 and Oct. 4, 1927, pp. 466–471 and 511–514, 5 figs. Discusses amount of supersaturation, if any, effect of supersaturation on stage efficiency, and proper design of nozzles and buckets to take account of supersaturation.

Testing. Terminology and Calculation Methods for Steam-Turbine Tests, N. A. Davidov. Thermo-Tech. Inst., no. 10, 1926, pp. 28–57, 5 figs. Discusses principles of testing various elements of steam-turbine plants and methods of representation and reduction of results; extensive bibliography of official testing codes and standards of all important European and American engineering organizations.

Vibration. A Remedy for a Case of Turbine Vibration, J. E. Housley. Power, vol. 66, no. 8, Aug. 23, 1927, pp. 286–287, 2 figs. Experience with a vertical 2250-kw. turbine operating at 900 r.p.m.

STEEL

Alloy. See ALLOY STEELS.

Annealing. The Annealing of Mild Steel Sheets, C. A. Edwards and J. C. Jones. Forging—Stamping—Heat Treating, vol. 13, no. 8, Aug. 1927, pp. 316–319. Investigation discloses influence of temperature on properties, as determined by Erichsen test, of sheets of varying thickness. See also Blast Furnace & Steel Plant, vol. 15, no. 8, Aug. 1927, pp. 396–399.

Carbon in. Factors Affecting Total Carbon in Steel. Iron Age, vol. 120, no. 9, Sept. 1, 1927, p. 535. Important results from study of six German blast furnaces; silicon content and crucible temperatures affect carbon content.

Carburizing of. Studies on Normal and Abnormal Carburizing Steels, O. E. Harder, L. J. Weber and T. E. Jerabek. Am. Soc. for Steel Treat.—Advance Paper, no. 12, for mtg. Sept. 19 to 23, 1927, 34 pp., 36 figs. This paper is rather preliminary in nature; it reports studies on normal and abnormal carburizing steels under following general headings: Effect of heating abnormal steels in vacuo at carburizing temperatures; effect of heating normal steels in nitrogen, oxygen, and carbon dioxide; effect of melting normal and abnormal steels in vacuo in alundum and in magnesite crucibles; effect of melting normal steels in atmospheres of nitrogen and carbon monoxide; effect of heating normal steels in contact with sonims; x-ray examination, by powder method, of normal and abnormal steels; normality of metals deposited by electric arc under number of conditions and with some alloy-steel welding rods has been investigated; mechanism is proposed for formation of structure found in abnormal carburizing steels.

Case-Hardening. Case Hardening of Steel by Means of Chloride of Silica (La cementation du fer par le chlorure de silicium), M. A. Sanfourche. Metallurgie et la Construction Mecanique, no. 32, Aug. 11, 1927, p. 19. Two series of experimental steel was hardened to depth of 0.3 to 2.7 cm. after $^1/_2$ to 3 hours treatment with chloride of silica at temperatures ranging from 900 deg. cent. to 1150 deg. cent.

Constitution of. The Constitution of Steel and Cast Iron, F. T. Sisco. Am. Soc. for Steel Treat.—Trans., vol. 12, no. 2, Aug. 1927, pp. 279–290, 3 figs. Present installment, tenth of series, discusses effect of four common elements, silicon, sulphur, phosphorus, and manganese on the iron-carbon alloys containing 2.00 per cent or more carbon—(the cast irons); each element is discussed under two heads; first, amount of element in cast iron and how the percentage is controlled; and second, effect of the element on the constitutional changes, microstructure and properties.

Copper-Bearing. Copper-Bearing Structural Steel (Baustahl mit Kupferzusatz), F. Bohny. Bautechnik, vol. 5, no. 34, Aug. 5, 1927, pp. 477–478, 2 figs. Summary of European and American data on effect of copper content on loss of weight by rusting; cost analysis showing economy of copper treatment as anti-corrosion paint saving measure.

Deterioration of. Deterioration of Structural Steels in the Synthesis of Ammonia, J. S. Vanick. Am. Soc. for Steel Treat.—Trans., vol. 12, no. 2, Aug. 1927, pp. 169–189 and (discussion) 189–194, 11 figs. Explanation of mechanism of deterioration of steels is advanced; from facts that oxides are reduced, carbides are decomposed, and nitrides formed in chromium steels after slight decarburization has been achieved, explanation of mechanism of deterioration is advanced which regards ammonia as active corrosive, and metal as porous filter which permits ammonia enrichment to destructive concentration.

Direct from Ore. The Manufacture of Steel in "One Process" Direct from Ore, O. Smalley and F. Hodson. Am. Electrochem. Soc.—Advance Copy, for meeting Apr. 28, 29, and 30, 1927, pp. 706–723, 4 figs. Description of the Pehrson-Prentice and "Carsil" processes.

Fatigue Tests. Fatigue Tests of Carburized Steel, H. F. Moore and N. J. Alleman. Am. Soc. for Steel Treating—Preprint for 9th Annual Convention, Sept. 19 to 23, 1927, 14 pp., 12 figs. Three steels were studied; a plain carbon steel, nickel steel, and chromium-nickel steel; several different treatments were tried for each steel; in general, test results suggest that carburizing, followed by suitable heat treatment, is promising means of increasing fatigue strength of steel as well as effective means of increasing surface hardness; steel quenched in oil from carburizing pot showed more increase in fatigue strength than did steel cooled in carburizing pot.

Heat-Resisting. Heat-Resisting and Non-Corrodible Steels. Instn. of Aeronautical Engrs.—Jl., vol. 1, no. 8, Aug. 1927, pp. 5–44, 17 figs. Present paper is concerned with the products resulting from research carried out by Messrs. Hadfields, Ltd., of Sheffield, and by the French engineers, Messrs. Commentry, Fourchambault and Decazeville, of Imphy, in whose laboratories were carried out the researches of the well-known metallurgists, Dumas, Guillaume, Chevenard, Muguet, Fayol and Girin.

High-Speed. See STEEL, HIGH-SPEED.

High Temperatures, Effect of. Properties of Steel at High Superheat Temperatures, A. McCance. Mech. World, vol. 81, no. 2111 and 2113, June 17 and July 1, 1927, pp. 434–435 and 5–6, 11 figs. Examination of temperature-strength curves for various steels; secondary effects of prolonged high temperature.

Locomotive Forgings. Locomotive Forging Steels, O. V. Greene. Am. Soc. for Steel Treating—Preprint for 9th Annual Convention, Sept. 19 to 23, 1927, 16 pp., 18 figs. The author gives results of tests made on various types of heat-treated alloy steels for reciprocating locomotive parts.

Manganese. See MANGANESE STEEL.

Metallurgy. The Melting or Molten Stage of Steel Manufacture with Particular Reference to the Deoxidizing, Refining and Contamination Phases, G. A. Dornin. Am. Soc. for Steel Treating—Preprint for 9th Annual Convention, Sept. 19 to 23, 1927, 6 pp. Bad effects of oxides in steel and only known methods for their removal from molten bath; various steel-melting processes and their possibilities for good steel making as shown by their capacity to make steel free from or relatively free from oxides.

Proportional Limit at High Temperatures. On the Significance of the Proportional Limit of Steel at Elevated Temperatures, F. B. Foley. Am. Soc. for Steel Treat.—Advance Paper, no. 13, for mtg. Sept. 19 to 23, 1927, 11 pp., 2 figs. Author believes that in elevated-temperature testing, the proportional limit is the sum of two factors, thermal expansion and mechanical stressing.

Silicon. See SILICON STEEL.

Stresses, Prolonged. The Behavior of Mild Steel Under Prolonged Stress at 300 Deg. Cent., W. Rosenhain. Engineering, vol. 124, no. 3219, Sept. 23, 1927, pp. 409–410. Experiments which authors have undertaken have been devised in order to determine effect of prolonged application of stresses to mild steel at temperature of 300 deg. cent., particularly with view to determining whether stresses well below normal tensile strength will cause failure if applied for very long time.

Tool. See TOOL STEEL.

STEEL FOUNDRIES

Electric. Preheating Reduces Melting Period, E. Bremer. Foundry, vol. 55, no. 16, Aug. 15, 1927, p. 626–630 and 642, 7 figs. Description of Burnside Steel Foundry Co., Chicago, Ill.

STEEL, HEAT TREATMENT OF

Ball-Bearing Steel. Heat Treatment of Two Ball Bearing Steels, B. Kjerrman. Am. Soc. for Steel Treating—Preprint for 9th Annual Convention, Sept. 19 to 23, 1927, 20 pp., 8 figs. This paper gives results of electrical resistance tests on two ball-bearing steels, one of common type, the other with higher content of chromium and the addition of molybdenum.

Castings and Forgings. High Temperature Treatments of Castings and Forgings as Evidenced by Core Drill Tests From Heavy Sections, W. J. Merten. Am. Soc. for Steel Treating—Preprint for 9th Annual Convention, Sept. 19 to 23, 1927, 22 pp., 25 figs. Discusses results of investigations conducted primarily to determine correct thermal treatments for improvement of grain structure of heavy section steel castings, so as to enable designing engineer to make better use of this material than heretofore; it also includes study of limitations of current practice of evaluating physical properties of large steel castings and forgings from comparatively small coupon tests.

Definition of Terms. Terms Relating to Heat Treatment. Forging—Stamping—Heat Treating, vol. 13, no. 8, Aug. 1927, pp. 300–301. Definitions are result of labors of committees, appointed by three societies, for purpose of clarifying terms whose meaning was uncertain.

Design and. Design from the Heat Treating

Standpoint, G. M. Eaton. Am. Soc. for Steel Treating—Preprint for 9th Annual Convention, Sept. 19 to 23, 1927, 19 pp., 7 figs. The author stresses need for close coöperation between metallurgist and the mechanical engineer.

Furnaces and Methods. Modern Furnaces and Heat Treating Methods, E. F. Davis. Am. Soc. for Steel Treat.—Trans., vol. 12, no. 2, Aug. 1927, pp. 291–302. Author of this paper has described and discussed in a practical way the various methods which are in use in many manufactories in the heating of steel parts for forging, hardening and tempering; he makes a plea for a more thorough study of problems of average heat treatment departments whereby these departments may be provided with more efficient heating equipment; comparison is made of type of high production machining equipment which is provided for most machine shops in contrast to antiquated inefficient heating equipment found in many of the so-called modern plants; a discussion of the merits of the different methods and types of furnaces used in heating metal parts is dealt with at length.

Future of. Heat Treatment Is Adding Steadily to the Effective Service of Steel and Non-Ferrous Metals—Greater Things Just Ahead. Iron Age, vol. 120, no. 10, Sept. 8, 1927, pp. 609–620. Various opinions as to the future of heat treatment.

Hardening. Hardening by Reheating After Cold Working, M. A. Grossmann and C. C. Snyder. Am. Soc. for Steel Treating—Preprint for 9th Annual Convention, Sept. 19 to 23, 1927, 16 pp., 18 figs. Authors advance theory which explains phenomenon of hardening of cold-worked steel by reheating of low temperatures; attention is called to certain significant features observed under microscope, and other evidence is offered pointing to simple reason for observed changes in strength, hardness, and ductility; effects of reheating after quenching as well as cold working are discussed in detail, and their different natures are set forth.

Pitfalls in. Pitfalls in Heat Treatment, J. W. Urquhart. Machy. (Lond.), vol. 30, no. 776, Aug. 25, 1927, pp. 658–659. Cracking; source of undisclosed cracking in steel; tempering the hardened zone; difficulties with non-uniformity of section.

Quenching. Oils as Quenching Media for Steels. Forging—Stamping—Heat Treating, vol. 13, no. 8, Aug. 1927, p. 326. Discussion of use of vegetable and mineral oils with slight reference to properties imparted by air.

What Happens When High Speed Steel Is Quenched, B. H. De Long and F. R. Palmer. Am. Soc. for Steel Treating—Preprint for 9th Annual Convention, Sept. 19 to 23, 1927, 11 pp., 11 figs. This paper deals with metallography of high-speed steel when tempered at 1100 deg. fahr. after cooling during quenching to varying temperatures below 1300 deg. fahr.; authors make following observations: High-speed tools tempered at 1100 deg. fahr. before being allowed to become sufficiently cold in quench are brittle due to mixed structures; straightening of high-speed tools may be readily carried out during quenching at temperatures between approximately 1300 and 700 deg. fahr.; method is indicated for determining whether high-speed tools have been quenched to sufficiently low temperature before tempering.

Selection of Equipment. Selecting Electric Heat-Treating Equipment, E. Fleischmann. Machy. (N. Y.), vol. 34, no. 1, Sept. 1927, pp. 66–70, 7 figs. First of two articles explaining various points to be considered in planning installations.

Thermal Stresses. Thermal Stresses in the Cooling of Large Castings, with Reference to Treatment of Large Solid-Cylinder Forgings (Wärmespannungen beim Abkühlen grosser Güsse bzw. beim Vergüten grosser Schmiedestücke im Form von Vollzylindern), E. Maurer. Stahl u. Eisen, vol. 47, no. 32, Aug. 11, 1927, pp. 1323–1327. A theoretical conservative analysis giving values which seem to be exceeded in practice; influence of tempering and bearing of elastic limits on tempering temperatures.

STEEL, HIGH SPEED

Faulty Hardening of. Faulty Hardening of High-speed Steel, E. Hundremont and H. Kallen. Eng. Progress, vol. 8, no. 8, Aug. 1927, pp. 199–200, 5 figs. Some examples of some faultily hardened high-speed steel parts.

STOKERS

Characteristics. The Characteristics of Modern Stokers, F. H. Daniels. Mech. Eng., vol. 49, no. 10, Oct. 1927, pp. 1076–1078, 5 figs. Characteristics demanded of modern stokers and the way in which these requirements are met by traveling-grate and multiple-retort underfeed types; air control along length of retort and duplex firing of multiple-retort underfeed stokers.

STREET RAILWAYS

Cable. Melbourne Cable Tramway System, W. Pollock. Indus. Australian & Min. Standard, vol. 78, no. 2002, July 14, 1927, pp. 36–37. Detailed description of the ropes, power, and machinery which have been used and have resulted in a high state of efficiency being maintained for nearly forty years.

T

TAPS

Design and Construction. Design and Construction of Taps, A. L. Valentine. Machy. (N. Y.), vol. 34, no. 1, Sept. 1927, pp. 57–61, 4 figs. Acme and square thread taps in sets; staybolt taps.

TERMINALS, RAILWAY

Atlanta, Ga. One of the Largest Freight Stations, J. Marsh. Railroad Herald, vol. 31, no. 10, Sept. 1927, pp. 25–28. Describes freight station at Atlanta, Ga., where about 5000 cars are handled in transfer each month; efficient management gives economical operation.

Greensboro, S. C. Southern Builds New Passenger Station at Greensboro, N. C. Ry. Age, vol. 83, no. 10, Sept. 3, 1927, pp. 439–444, 4 figs. Structure recently completed, together with enlarged track layout, provides modern facilities and remedies difficult operating problems.

TEXTILES

Automatic Looms. Better Woolen and Worsted Weaving, with Special Reference to the Automatic Loom, B. F. Hayes. Textile World, vol. 72, no. 9, Aug. 27, 1927, pp. 44–47. Advice for overseer, fixer, weaver, and dresser; weaving warps of fine single yarns.

TIDAL POWER

Utilization. Power from the Sea, C. W. Olliver. Power Engr., vol. 22, no. 258, Sept. 1927, pp. 326–330, 11 figs. A study of the practicability of tidal power schemes and that of the utilization of the temperature variations of the sea.

TIRES, RUBBER

Manufacture. Cycle Inner Tubes. India-Rubber Jl., vol. 74, no. 6, Aug. 6, 1927, pp. 211–217. Practical notes on their manufacture.

TOOL STEEL

Tempering. Effect of Silicon, Nickel, Chromium, and Tungsten on the Tempering of Tool Steel (Der Einfluss von Silizium, Nickel, Chrom und Wolfram auf die Härtung von Werkzeugstahl), W. Haufe. Stahl u. Eisen, vol. 47, no. 33, Aug. 18, 1927, pp. 1365–1373, 7 figs. Report on two series of experiments made at the Krupp works in Essen; specimens were subjected to repeated tempering until cracks appeared; relations between composition, annealing temperatures, number of temperings and increase in volume of hypo- and hyper-eutectoid steels; study of fracture structure.

TRACTORS

Farm. The Kinematics and Dynamics of the Wheel Type Farm Tractor, E. G. McKibben. Agric. Eng., vol. 8, nos. 1, 2, 3, 4, 5, 6, and 7, Jan., Feb., Mar., Apr., May, June and July, pp. 15–16, 39–40 and 43, 58–60, 90–93, 119–122, 155–160 and 187–189, 42 figs. Shows by means of careful analysis using proven principles of mathematics and physics, (1) form and characteristics of motions which may be taken by tractor, and (2) relationship between, and tendency results produced by, various forces acting upon tractor. Jan.: Kinematics. Feb.: Dynamics—locating center of gravity. Mar.: External forces. Apr.: Turning moments of external forces. May: Stability. June: Supporting soil reactions and drawbar pull. July: Kinematics and dynamics of wheel-type farm tractor.

German. Improvements in Tractors (Verbesserungen an Zugmaschinen—Von neuen Deutz—Schlepper), W. Benedict. Fördertechnik u. Frachtverkehr, vol. 20, no. 15, July 22, 1927, pp. 271–272, 4 figs. Description of new Deutz tractors, 6 to 8 tons pulling capacity, remarkable for sturdy, compact construction and convenience of control; powered with compressionless 14-hp. 4-cycle horizontal Diesel motor of 600 r.p.m.

Steam. Steam Tractor for Overseas. Engineer, vol. 144, no. 3736, Aug. 19, 1927, pp. 208–209, 4 figs. Engine develops 86 b.hp., it weighs without fuel and water 9 tons, and without spuds can exert drawbar pull of over 6700 lb., and with spuds on firm ground it has, to use locomotive term, starting tractive effort of 10 tons.

Suction-Gas. Suction Gas Tractor with Parker Producer Hauling 3-Furrow Plough, P. Brotherhood and J. and F. Howard. Engineer, vol. 144, no. 3730, July 8, 1927, p. 37, 2 figs. Account of plowing trial at Perivale, England, to demonstrate practicability of using charcoal fuel on agricultural tractors.

W

WASTE

Industrial, Disposal of. Industrial Waste Disposal. Am. Soc. Civ. Engrs.—Proc., vol. 53, no. 7, Sept. 1927, pp. 1659–1712. Symposium of five papers dealing with wastes in oil refineries, coal mines, pulp and paper mills, and tanneries.

WATER HEATERS

Heat Transfer. Heat Transfer in Tubular Water Heaters, O. E. Frank. Am. Soc. Heat. & Vent. Engrs., vol. 33, no. 7, July 1927, pp. 415–422, 4 figs. Discusses following factors: whether water is to flow through tubes or around them; diameter of tubes; velocity of water if in tubes; allowable pressure drop on water side of heater; proper drainage of heater; elimination of air in steam spaces.

WELDING

Aluminum Sheet. Welding Pure Aluminum Sheet, T. C. Fetherston. Am. Welding Soc.—Jl., vol. 6, no. 7, July 1927, pp. 29–36, 9 figs. Importance of selecting material of good welding quality, using welding rods and flux of proper composition and quality, etc.

Atomic-Hydrogen. Atomic Hydrogen Welding Practicable. Chemicals, vol. 28, no. 9, Aug. 29, 1927, pp. 7–9, 3 figs. A new process by which hitherto unweldable metals can be melted and fused without the slightest trace of oxidation.

New Equipment Developed for Atomic Hydrogen Welding. Automotive Industries, vol. 57, no. 7, Aug. 13, 1927, p. 237, 2 figs. Principle of operation same as in design previously announced by General Electric Co., but mechanical and electrical features are improved; three units in outfit.

Electric. See ELECTRIC WELDING, ARC.

Multiple-Operator Plants. Multiple-operator Arc Welding Plants for A. C. and D. C. Supplies, C. H. S. Tupholme. Mech. World, vol. 82, no. 2119, Aug. 12, 1927, p. 109, 1 fig. Types of control for a.c. and d.c. plants.

Oxyacetylene. See OXYACETYLENE WELDING.

Tanks. Safe, Economical Storage for Fuel Oils, T. E. De Pew. Welding Engr., vol. 12, no. 8, Aug. 1927, pp. 37–40, 11 figs. Welded rectangular tanks of over 100,000 gallons capacity solve the storage problem at low construction cost.

Steel Manufacture. Welding a Factor in Steel Manufacture. Can. Machy. & Mfg. News, vol. 38, no. 7, Aug. 18, 1927, pp. 17–24, 14 figs. Utility of welding process in construction, maintenance, operation, and dismantling of open-hearth furnaces is explained to emphasize economies possible from use of welding art.

Steel, Spot. Spot Welding of Dissimilar Metals, R. T. Gillette. Gen. Elec. Rev., vol. 30, no. 9, Sept. 1927, pp. 443–445, 6 figs. Uses of spot welding process; comparison with other methods; electrode material for dissimilar metals; electrode shape for unlike thicknesses; tests.

WELDS

Red Shortness. The Red-Shortness of Weld Metal, A. H. Goodger. Welding Jl., vol. 24, nos. 285 and 286, June and July, 1927, pp. 166–169 and 198–203, 24 figs., and (discussion), no. 287, Aug. 1927, pp. 230–232. Trouble is usually due to presence of certain impurities such as sulphur or oxygen, which may give rise to brittle films between grains; fractures are usually intergranular.

WIND TUNNELS

Open-Jet Cones. Study of Open Jet Wind Tunnel Cones, F. E. Weick. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 260, Aug. 1927, 15 pp., 5 figs. Tests have been made by Nat. Advisory Committee for Aeronautics on air flow in open-jet wind tunnel with various sizes, shapes, and spacings of cones, and flow studies by means of velocity and direction surveys in conjunction with flow pictures; it was found that for all combinations of cones tested flow is essentially same, consisting of inner core of decreasing diameter having uniform velocity and direction, and boundary layer of more or less turbulent air increasing in thickness with length of jet; energy ratio of tunnel was obtained for different combinations of cones, and spilling around exit cone causing undesirable air currents in experiment chamber was noted; empirical formula is given for design of cones having no appreciable spilling.

Variable-Density. Work in the Variable Density Wind Tunnel of the N.A.C.A., E. N. Jacobs. Aviation, vol. 23, no. 11, Sept. 12, 1927, pp. 620–623. Summary of work carried on during past four years at laboratory of Natl. Advis. Comm. for Aeronautics at Langley Field.

WOOD

Preservation of. Experiments in Wood Preservation, L. P. Curtin. Indus. & Eng. Chem., vol. 19, no. 9, Sept. 1927, pp. 993–999, 3 figs. Arsenites of copper and zinc.

WOODWORKING

Costs. Excessive Labor Costs in Machine Room. Wood-Worker, vol. 46, no. 6, Aug. 1927, pp. 25–26. Some of the numerous but elusive causes for excessive production costs; suggests some logical remedies for same.

Mass Production Methods. Mass Production of Wooden Spare Parts Used in Railroad Maintenance (Massenfertigung von Holzersatzteilen in Eisenbahnwerken), Bardtke. V.D.I. Zeit., vol. 71, no. 32, Aug. 6, 1927, pp. 1117–1122, 21 figs. Reviews evolution of production of window frames, toilet seats, plugs, etc.; from manual to machine methods and points out economies achieved; also describes modern mechanical handling of lumber.

WOODWORKING MACHINERY

Planers. A Butler Special Traverse Head Draw Cut Planing Machine. Brit. Machine Tool Eng., vol. 4, no. 46, July-Aug. 1927, pp. 645–647, 4 figs. New traverse-head draw-cut planing machine that has been designed and constructed by Butler Machine Tool Co., Ltd., of Halifax, for shaping flat pole seatings inside yokes of electric motors.

"Twist" Eliminator. A New Woodworking Machine. Brit. Machine Tool Eng., vol. 4, no. 46, July-Aug. 1927, pp. 631–632, 1 fig. Describes machine built by Thomas White & Sons, Ltd., Paisley, England, for taking "twist" out of wood or planing it out of "wind;" saves time and money; can be arranged for drive by independent electric motor, or belt drive.

WOODWORKING PLANTS

Pneumatic Refuse Collection. Pneumatic Refuse Collecting in Large Millroom, W. H. Rohr. Wood-Worker, vol. 46, no. 6, Aug. 1927, pp. 28–29, 6 figs. Describing a modern relay system of pneumatic refuse collection which is in operation in a new furniture factory millroom, 70 x 400 ft. in size.

THE ENGINEERING INDEX

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Mechanical Engineering Section

THE ENGINEERING INDEX presents each month, in conveniently classified form, items descriptive of the articles appearing in the current issues of the world's engineering and scientific press of particular interest to mechanical engineers. At the end of the year the monthly installments are combined along with items dealing with civil, electrical, mining and other branches of engineering, and published in book form, this annual volume having regularly appeared since 1906. In the preparation of the Index by the engineering staff of The American Society of Mechanical Engineers some 1200 technical publications received by the Engineering Societies Library (New York) are regularly reviewed, thus bringing the great resources of that library to the entire engineering profession.

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ABRASIVES

Automotive Industry. Abrasives and Grinding, L. H. Milligan. Indus. & Eng. Chem., vol. 19, no. 10, Oct. 1927, pp. 1127–1131, 7 figs. Various uses of abrasives for grinding in automotive industry; types of abrasives and their production; polishing wheels and abrasives paper; effect of lubricant.

ACCIDENT PREVENTION

Industrial. Values of Accident Prevention, O. M. Graves. Cement, Mill & Quarry, vol. 31, no. 7, Oct. 5, 1927, pp. 28–36. Considering the economic and psychological values of reducing industrial accidents; analysis of conditions in the crushed stone industry. See also Pit & Quarry, vol. 15, no. 1, Oct. 12, 1927, pp. 63–68.

Production and. Accident Prevention and Production, J. E. Hannum. Safety Eng., vol. 54, no. 3, Sept. 1927, pp. 83–86, 7 figs. Findings of Committee on Safety and Production of Am. Eng. Council show very definite relationship between safety and production; report based on statistical information secured from some 14,000 companies representative of American industry.

AERODYNAMICS

Model Experiments. Recent Model Experiments in Aerodynamics, R. G. Richardson. Roy. Aeronautical Soc.—Jl., vol. 31, no. 201, Sept. 1927, pp. 810–839 and (discussion) 839–843, 27 figs. Describes experiments on air flow in relation to models which lead up from fundamental ideas on "boundary layer" of Prandtl, through study of comparatively simple systems like cylinders and rotating cylinders and airfoils, with sidelights on circulation theory of airfoil, to complex systems like airscrew and supporting screw of auto-gyro. Bibliography.

AIR CONDITIONING

Unit System. The Unit System Applied to Air Conditioning, H. P. Gant. Indus. Power, vol. 8, no. 3, Sept. 1927, pp. 58–60 and 64–66, 3 figs. Disadvantages of central system and advantages of unit system.

AIRPLANE ENGINES

Air-Cooled. Air-Cooled Engine Development, C. L. Lawrance. Aviation, vol. 23, no. 13, Sept. 26, 1927, pp. 723–725, 6 figs. Development of air-cooled engines in different countries before and since War.

Packard "X" Type. Packard "X" Type Aircraft Engine Is Largest in World. Automotive Indus., vol. 57, no. 15, Oct. 8, 1927, pp. 546–547. Has 24 cylinders in four banks of six each and develops 1200 hp. at 2700 r.p.m.; piston displacement 2775 cu. in.; engine weighs less than 1.2 lb. per hp.

Production Methods. The Wright Whirlwind Engine Production Methods, L. M. Beatty. Soc. Automotive Engrs.—Jl., vol. 21, no. 4, Oct. 1927, pp. 361–369, 8 figs. Despite many operations, tests and inspections, progressive machining and assembling methods are followed, and multiple drilling and other means are used for economical production; procedure exemplifies application to quantity machine production of thorough care associated with individual master-mechanic handwork.

Ryan-Siemens. The Ryan-Siemens Engine. Aviation, vol. 23, no. 17, Oct. 24, 1927, pp. 998–1001, 5 figs. Engines with five, seven and nine cylinders, respectively, have normal outputs of 70, 100, and 125 hp.; stationary cylinders are arranged radially and consist of open steel journal with aluminum-alloy heads screwed on; they are provided with drop valves which are actuated by push rods and roller tappets; all engines are supplied with two Siemens magnetos and each cylinder with two Siemens spark plugs.

Superchargers. Next Step, Superchargers? F. W. Wead. Aviation, vol. 23, no. 12, Sept. 19, 1927, pp. 671–673, 3 figs. Discussion of possibilities of fan-type and Roots or NACA-type blower superchargers.

AIRPLANE PROPELLERS

Origin of. The First Screw Propeller, W. L. Marsh. Engineer, vol. 144, no. 3744, Oct. 14, 1927, pp. 415–416. Use of propeller, both in conception and in actual practice, quite considerably antedated marine propeller.

Whirl Theory. Experiments with Models Demonstrating the Whirl Theory of Screw Propellers (Modellversuche zur Nachprüfung der Treibschrauben-Wirbeltheorie), H. B. Helmbold and H. Lerbs. Werft—Reederei—Hafen, vol. 8, no. 17, Sept. 7, 1927, pp. 347–350, 7 figs. Experiments on four-propeller types done at aerodynamic experiment station of Goettingen, found to agree with the Betz-Prandtl theory.

AIRPLANES

Airfoil Tests. Air Force Tests of Sperry Messenger Model with Six Sets of Wings, J. M. Shoemaker. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 269, 1927, 20 pp., 20 figs. Purpose of this test was to compare six well-known airfoils, the R.A.F. 15, U.S.A. 5, U.S.A. 27, U.S.A. 35-B, Clark Y, and Göttingen 387, fitted to the Sperry Messenger model, at full-scale Reynolds number as obtained in variable-density wind tunnel of the Nat. Advisory Comm. for Aeronautics; and to determine the scale effect on the model equipped with all the details of the actual airplane; results show a large decrease in minimum drag coefficient upon increasing the Reynolds number from about one-twentieth scale to full scale; maximum lift coefficient was increased with increasing scale for all airfoils except the Göttingen 387, for which it was slightly decreased; a comparison is made between the results of these tests and those obtained from tests made in this tunnel on airfoils alone.

Experiments on Airfoils with Trailing Edge Cut Away, J. Ackeret. Nat. Advisory Comm. for Aeronautics—Tech. Memorandums, no. 431, Sept. 1927, 10 pp., 6 figs. Experiments performed on two different airfoils with successive shortening of their chords to determine effect of cutting away trailing edge on lift and drag and on position of center of pressure.

Amphibian. The Loening OL-8 Amphibian. Aviation, vol. 23, no. 17, Oct. 24, 1927, pp. 1002–1008, 10 figs. Successful U. S. Navy experimental model is powered with 425-hp. Pratt & Whitney "Wasp" engine.

Bombers. The Boulton & Paul "Sidestrand." Flight, vol. 19, no. 37, Sept. 15, 1927, p. 645, 1 fig. Day-bomber fitted with two Bristol Jupiter engines; all-metal machine, with reduced "interference effect."

Commercial. The Kreider-Reisner "Challenger." Aviation, vol. 23, no. 14, Oct. 3, 1927, pp. 825–826. New three-place light commercial plane is powered with an OX5 engine, carries useful load of 764 lb., and has high speed of 102 m.p.h.

Compasses for. The Installation and Correction of Compasses in Airplanes, M. F. Schoeffel. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 262, Aug. 1927, 17 pp., 4 figs. Paper has been prepared primarily for the benefit of the pilot who has never studied navigation and who does not desire to go into the subject more deeply than to be able to fly compass courses with confidence; it also contains material for the designer who wishes to install his compasses with the expectation that they may be accurately corrected.

De Havilland. The De Havilland "Tiger Moth." Flight, vol. 19, no. 38, Sept. 22, 1927, pp. 665–668, 9 figs. "Tiger Moth" monoplane racer, fitted with 130-hp. De Havilland engine, has speed of 186.5 m.p.h. and altitude of 20,000 ft.; details of design.

Design. Design of Airplane Cellule (Le calcul d'une cellule d'avion basé sur les déformations de la cellule). Technique Automobile et Aérienne, vol. 18, no. 137, 1927, pp. 58–62, 4 figs. Elaborate mathematical analysis based on deformations of cellule; application of formulas derived, graphical representation.

Drag. Drag Measurements on a Junkers Wing Section, H. Weidinger. Nat. Advisory Comm. for Aeronautics—Tech. Memorandums, no. 428, Sept. 1927, 47 pp., 25 figs. Application of the Betz method to the results of comparative tests made on a model and on an airplane in flight. From "Berichte und Abhandlungen der Wissenschaftlichen Gesellschaft für Luftfahrt," December, 1926.

Drag of Wings with End Plates, P. E. Hemke. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 267, 1927, 13 pp., 12 figs. Formula for calculating induced drag of multiplanes with end plates and approximate calculation of frictional drag of end plates; reduction of induced drag, when end plates are used, is sufficiently large to increase efficiency of wing; curves showing reduction of drag for monoplanes and biplanes; influence of gap-chord ratio, aspect ratio and height of end plate for typical cases; method of obtaining reduction of drag for a multiplane; comparisons are made of calculated and experimental results obtained in wind-tunnel tests with airfoils of various aspect ratios and end plates of various sizes.

Focke-Wulf. Germany Revives "Tail-First" Machine. Flight, vol. 19, no. 39, Sept. 29, 1927, pp. 679–681 and 690, 4 figs. Discussion of principle of design of tail-first airplanes; test results of Focke-Wulf plane designed according to this principle.

Gliders. Building a Full-Size Glider, F. J. Camm. Nat. Advisory Comm. for Aeronautics—Tech. Memorandums, no. 429, Sept. 1927, 11 pp., 25 figs. General details and construction of gliders. From Air League Bul. of Air League of British Empire, London.

Load Factor. A Load Factor Formula, R. G. Miller. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 263, Aug. 1927, 8 pp., 1 fig. Discussion of deriving formulas for determining proper load factor for design which will check actual experience and also be fundamentally rational in order to merit replacement of arbitrary factors.

Mail and Freight. German Freight Airplanes (Deutsche Lastenflugzeuge), D. Oefele. Fördertechnik u. Frachtverkehr, vol. 19, nos. 16 and 17, Aug 5 and 19, 1927, pp. 277–281 and 299–303, 22 figs. Construction and operation of recent Junker, Dornier, Rohrbach and other types of airplanes and hydroplanes for transportation of mail, newspapers, and freight.

NOTE.—The abbreviations used in indexing are as follows:
Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

Military. The Boeing Shipboard Fighter. Aviation, vol. 23, no. 18, Oct. 31, 1927, pp. 1058–1059, 2 figs. Type F3B-1 is single-seater plane powered with Pratt & Whitney "Wasp" engine.

Monocoupe. The Central States "Monocoupe." Aviation, vol. 23, no. 15, Oct. 10, 1927, pp. 895–896, 3 figs. Small two-place closed-cabin monoplane powered with 75-hp. Detroit Air-Cat engine has a high speed of 102 m.p.h. and stalling speed of 43 m.p.h.

Ryan. Building the Ryan Monoplane, J. Homewood. Machy. (N. Y.), vol. 34, no. 2, Oct. 1927, pp. 126–128, 10 figs. Methods employed in building plane used by Lindbergh.

Seaplanes. See SEAPLANES.

Travel Air. The Travel Air Transport Monoplane. Aviation, vol. 23, no. 15, Oct. 10, 1927, pp. 878–880, 5 figs. Travel Air closed cabin transport monoplane, type 5000, now in regular production at factory of Travel Air Mfg. Co., Wichita, Kan., is of conventional construction, having welded steel fuselage and a wooden wing which is externally braced; powered with a Wright Whirlwind and carried a full load of 3600 lb. at 123 m.p.h.

Wheels. Static and Dynamic Behavior of Standard Airplane Wheels (Il Comportamento Statico e Dinamico delle Ruote Unificate per Aeroplano), A. Guglielmetti and L. Ferrari. Rendiconti Tecnici della Direzione Generale del Genio Aeronautico—Ministero dell 'Aeronautica, vol. 15, no. 5, Sept. 1927, 40 pp., 56 figs. Report of tests, to collapse, of several sizes of wheels by static loads and impact; function of airplane wheels and their design in light of these tests.

AIRPORTS

Germany. Competitive Designs for Administration and Despatch Buildings of the Stettin Airport (Wettbewerb Verwaltungs und Abfertigungsgebäude Flughafen Stettin). Deutsche Bauzeitung, vol. 61, no. 18, Sept. 14, 1927, pp. 113–120, 23 figs. Sketches and brief discussions of seven projects of airport buildings for airplanes and seaplanes, also providing accommodations for passengers and their baggage; general layout of airport.

AIRSHIPS

Resistance. Tests of the N.P.L. Airship Models in the Variable Density Wind Tunnel, G. J. Higgins. Nat. Advisory Comm. for Aeronautics—Tech. Notes, no. 264, Sept. 1927, 8 pp., 5 figs. Tests have been conducted in variable-density wind tunnel of the Nat. Advisory Comm. for Aeronautics, on two airship models, known as the "N.P.L. Standardization Models, Long and Short." Resistance of shape coefficients were determined for each model through a range of Reynolds numbers from 110,000 to 5,000,000; comparison is made with previous tests on these models and other airship models.

ALIGNMENT CHARTS

Horsepower Determination. Oil Engine Horse-Power Nomograms, T. C. Crawhall. Marine Engr. & Motorship Bldr., vol. 50, no. 601, Sept. 1927, pp. 326–327, 2 figs. Two useful alignment charts for determining indicated and brake horsepower of heavy-oil engine. See also Shipbldg. & Shipg. Rec., vol. 30, no. 9, Sept. 1, 1927, pp. 236–237, 2 figs.

ALLOYS

Aluminum. See ALUMINUM ALLOYS.

Brass. See BRASS.

Copper. See COPPER ALLOYS.

Elektron, Age-Hardening. Age-Hardening Tests with Elektron Alloys, K. L. Meissner. Inst. of Metals—Advance Paper, no. 436, 1927, 18 pp., 5 figs. Six different Elektron alloys, made up by the I.G. Farbenindustrie A.G. at Bitterfeld (Germany), were examined with respect to their capability of age hardening by aging at room temperature and at elevated temperatures up to 200 deg. cent. with different aging periods of from 8 to 40 hours.

Iron. See IRON ALLOYS.

Lead. See LEAD ALLOYS.

Magnesium. See MAGNESIUM ALLOYS.

Physical Properties. The Constitution and Physical Properties of Some of the Alloys of Copper, Zinc, and Cadmium, C. H. M. Jenkins. Inst. of Metals—Advance Paper, no. 446, 1927, 39 pp., 59 figs. Constitution of the copper-zinc-cadmium alloys and the physical properties of the two most commonly used brasses containing small proportions of cadmium.

Tin. See TIN ALLOYS.

ALUMINUM

Castings. Effect of Method of Molding on Properties of Castings of Aluminum and Aluminum Alloys (Ueber den Einfluss der Formart auf die Materialeigenschaften von gegossenem Aluminium und Aluminium-Gusslegierungen), W. Claus and F. Goederitz. Giesserei-Zeitung, vol. 24, no. 18, Sept. 15, 1927, pp. 516–520, 18 figs. Comparative tests of strength, hardness, fineness, etc., of ingots, green molded and dry molded castings of aluminum and of German and American aluminum alloys, showing improvements with decrease in grain size; strength is in following order: ingot, green mold, dry mold.

Corrosion. The Protection of Aluminium and Its Alloys Against Corrosion, H. Sutton and A. J. Sidery. Inst. of Metals—Advance Paper, no. 439, 1927, 17 pp., 10 figs. Also Engineering, vol. 124, no. 3218, Sept. 16, 1927, pp. 376–377. Some experiments are described in which samples of aluminum and aluminum alloys were treated by various protective processes, including anodic oxidation, zinc-cadmium, and nickel-plating; certain practical features of the methods investigated and, also, the results of corrosion tests extending over periods of 1 to 2 years, are discussed.

ALUMINUM ALLOYS

Aluminum Bronze. Aluminum Bronzes (Étude sur les bronzes d'aluminium), J. Bouldoires. Revue de Métallurgie, vol. 24, nos. 7 and 8, July and Aug. 1927, pp. 357–376 and 463–473, 31 figs. Methods and results of an experimental study of heat reactions, electrical properties, density, hardness, and micrography of aluminum alloys containing 80 to 95 per cent of copper; bibliography.

Duralumin. See DURALUMIN.

Silicon and Iron. The Constitution of Alloys of Aluminum with Silicon and Iron, A. G. C. Gwyer and H. W. L. Phillips. Inst. of Metals—Advance Paper, no. 443, 1927, 53 pp., 68 figs. Constitution of binary alloys of aluminum with silicon and with iron; special attention paid to solubility of silicon in solid aluminum; constitution of certain of the ternary alloys of aluminum, silicon, and iron, under both equilibrium and metastable conditions. See also Metal Ind. (Lond.), vol. 31, no. 11, Sept. 16, 1927, pp. 245–246.

Undercooling. The Under-Cooling of Some Aluminum Alloys, M. L. V. Gayler. Inst. of Metals—Advance Paper, no. 442, 1927, 28 pp., 34 figs. Effect of under-cooling on the macro- and microstructure of some silicon-aluminum and copper-aluminum alloys; impossible to under-cool "modified" silicon-aluminum alloys systematically; curves of solubility represented by the "modified" diagram correspond closely to the super-solubility curves of the "normal" alloys.

AMMONIA COMPRESSORS

Two-Stage. Modern Two-Stage Ammonia Compressors, F. N. MacNeil. Power, vol. 66, no. 18, Nov. 1, 1927, pp. 663–666, 5 figs. Typical designs of compound compressors; methods of intercooling; use of clearance pockets; operating methods.

APPRENTICES, TRAINING OF

Methods and Results. Am. Foundrymen's Assn.—Advance Papers, nos. 27–32, for mtg. June 6–10, 1927, 35 pp. Group of papers dealing with apprenticeship as labor stabilizer; making apprenticeship pay dividends; publicity to attract apprentices; reducing apprentice turnover by careful selection and supervision; apprentice training in Milwaukee and Pittsburgh; coöperation first essential toward success in apprenticeship.

Inaugurating Apprentice Training, C. J. Freund. Indus. Mgmt. (N. Y.), vol. 74, no. 3, Sept. 1927, pp. 168–173, 4 figs. Installing apprentice-training system in various departments of Falk Corp., Milwaukee; experience gained valuable to executives in general.

Railways. Apprentice Training on the New York Central Lines, A. L. Stead. Ry. Gaz., vol. 47, no. 13, Sept. 23, 1927, pp. 370–374. Description of an old-established system of training apprentices operating in mechanical department of large American railway which aims at providing railway with skilled workmen, versed in both theoretical and practical features of their work.

ASH HANDLING

German Equipment. Modern Ash-Handling Plants (Neuzeitliche Entaschungsanlagen der Kesselhäuser), Thiele. Fordertechnik u. Frachtverkehr, vol. 18, no. 19, Sept. 2, 1927, pp. 318–319, 4 figs. Description of German equipment for handling of dry and wet ashes; ash scrapers, plate-belt conveyors, etc.

AUTOMOBILE ENGINES

Anti-Freeze Compounds. Antifreeze Compounds, D. B. Keyes. Indus. & Eng. Chem., vol. 19, no. 10, Oct. 1927, pp. 1119–1121. Reviews requirements of ideal anti-freeze compounds set up by automotive and chemical engineers. Bibliography.

Overhauling. Mack Methods of Overhauling Bus Engines. Am. Mach., vol. 67, no. 8, Aug. 25, 1927, pp. 309–312, 13 figs. Gives time required for operations, tools used, etc.

Six-Cylinder. Six-Cylinder Induction. Autocar, vol. 59, no. 1664, Sept. 23, 1927, pp. 547–552, 4 figs. One of most difficult problems encountered in development of small six-cylinder engine is concerned with distribution of ingoing charge so that each cylinder may receive a like quality and quantity of fuel.

AUTOMOBILE MANUFACTURING PLANTS

Ford Motor Co. Synchronizing Heating Processes into Straight Line Mechanical Production, J. B. Nealey. Fuels & Furnaces, vol. 5, no. 9, June 1927, pp. 1207–1212 and 1214, 10 figs. Mass production, made possible by specialized machinery developed to the highest point and specialized workmanship at peak of efficiency, all coördinated into one smoothly running unit, is the record of the Ford Motor Company at its Fordson plant; it is a record, also, that would never have been made had not many heating processes and heat-treating operations also been perfected, speeded up, and synchronized into straight-line mechanical production.

General Motors. American Methods Are Adopted for Production of New Vauxhall, M. W. Bourdon. Automotive Industries, vol. 57, no. 15, Oct. 8, 1927, pp. 540–544. General Motors increases capacity of plant from 40 to 200 chassis a week; engine of 168.5 cu. in. displacement has overhead valves with masked inlets.

AUTOMOBILES

Accessory Equipment. Accessory Equipment. Autocar, vol. 59, no. 1665, Sept. 30, 1927, pp. 623–628, 71 figs. Accessories exhibited at Olympia show; notes upon screen designs, buffers, grease and oil guns, wind-screen wipers, shock absorbers, direction indicators, and spring gaiters.

Alvis. Alvis Introduces a Six. Autocar, vol. 59, no. 1664, Sept. 23, 1927, pp. 555–558, 9 figs. Details of new 14-hp. six-cylinder Alvis designed for high duty as well as smoothness of running.

The Grand Prix Alvis. Autocar, vol. 59, no. 1663, Sept. 16, 1927, pp. 530–531, 6 figs. Exceedingly interesting design of a front-wheel driven car without a front axle, specially produced to compete in the British Grand Prix.

Armstrong Siddeley. Armstrong Siddeley New Six. Autocar, vol. 59, no. 1665, Sept. 30, 1927, pp. 637–639, 7 figs. Program for 1928 includes a new 15-hp. six-cylinder car, revisions to current models, fitting of central lubrication to all types, and lower prices.

Aston-Martin. A New Aston-Martin. Autocar, vol. 59, no. 1664, Sept. 23, 1927, pp. 565–566, 4 figs. Latest model of Aston-Martin is 4-cylinder, rated at 11.9 hp., and giving 1488 cc. capacity; special cooling system and other features.

Bean. Entirely New 14 hp. Bean. Autocar, vol. 59, no. 1663, Sept. 16, 1927, pp. 516–518, 8 figs. Many interesting details in an up-to-date design; continuation of the six-cylinder car; Sunshine saloons offered on both chassis.

Centering and Milling Set-Ups. Centering and Milling Set-Ups, F. H. Colvin. Am. Mach., vol. 67, no. 17, Oct. 27, 1927, pp. 649–650, 5 figs. Methods employed in making steering knuckles for Franklin automobile.

Chrysler. New 21–62 hp. Chrysler. Autocar, vol. 59, no. 1662, Sept. 9, 1927, pp. 479–480, 5 figs. Increased efficiency of the engines and strengthened transmission notable in the latest model.

The Chrysler "62." Auto-Motor Jl., vol. 32, no. 38, Sept. 22, 1927, pp. 787–789, 7 figs. Many refinements in the latest model; insulated power and transmission plant; higher engine performance; a new gear box; 21–62 hp.

Clyno. Clyno New Models. Autocar, vol. 59, no. 1663, Sept. 16, 1927, pp. 498–500, 7 figs. Introduction of a new 12–35 hp. four-cylinder chassis; announcement of a prospective 9-hp. small car; extra equipment and lower prices for the current 11-hp. range, and production of fabric saloons.

Constantinesco Converter. The Constantinesco Torque-Converter, R. K. Jack. Soc. Automotive Engrs.—Jl., vol. 21, no. 4, Oct. 1927, pp. 413–423, 8 figs. Purpose of mechanism is to produce instant and automatically variable torque that is always equal to resistance encountered while primary driving engine maintains its speed and torque nearly constant; application of torque converter to 5-hp. car and its automatic action under driving conditions.

Crossley. Improved Crossley Six. Autocar, vol. 59, no. 1662, Sept. 9, 1927, pp. 459–460, 4 figs. Refinements include vibration damper; new fabric and coachbuilt saloons on short wheelbase chassis.

Design and Maintenance. Design and Maintenance Costs. Motor Transport, vol. 45, no. 1175, Sept. 19, 1927, pp. 339–340. An investigation into the opportunities for constructional improvements that will facilitate repair operations.

Falcon-Knight. The Falcon-Knight Six. Autocar, vol. 59, no. 1662, Sept. 9, 1927, p. 476, 3 figs. Description of new medium-sized Knight-engined car with wheelbase of 9 ft. 1 in.; 45 hp. at 2600 r.p.m.; double-sleeve valves; coil ignition; four-wheel brakes.

Finishes. Automobile Finishes, H. C. Mougey. Indus. & Eng. Chem., vol. 19, no. 10, Oct. 1927, pp. 1102–1103. Contribution of chemist to development of paint and varnishes for automobiles; finishes which require high temperatures for drying, such as black baking enamel, and materials which may be dried at normal temperatures; lacquer finishes and their advantages.

Franklin Airman. Franklin "Airman" Has Larger Engine, P. M. Heldt. Automotive Industries, vol. 57, no. 15, Oct. 8, 1927, pp. 531–535. Increased piston displacement and higher engine speed give 24 per cent more horsepower; four-wheel brakes.

Hillman. Hillman 1928 Improvements. Autocar, vol. 59, no. 1663, Sept. 16, 1927, pp. 509–510, 3 figs. Modifications to the 14-hp. chassis and introduction of new coachwork, including smart fabric-covered and coachbuilt saloons. See also Auto-Motor Jl., vol. 32, no. 37, Sept. 15, 1927, p. 774.

Humber. Humber Improvements. Autocar, vol. 59, no. 1665, Sept. 30, 1927, pp. 590–592, 8 figs. Further detail refinement in the chassis, alteration of appearance, and increased comfort in coachwork; introduction of fabric saloons.

Isotta Fraschini. Isotta Fraschini Super Sports. Autocar, vol. 59, no. 1666, Oct. 7, 1927, pp. 674–675, 6 figs. High-grade Italian chassis with a straight-eight engine of over seven liters, and exceptionally powerful brakes.

Jordan. Jordan Uses Double-Inlet Manifold on New Air Line Eight, A. F. Denham. Automotive Industries, vol. 57, no. 15, Oct. 8, 1927, pp. 536–537. Novel design is calculated to eliminate trouble from unequal distribution which sometimes occurs in eight-in-line engines.

Lea-Francis. Extensive Lea-Francis Range. Autocar, vol. 59, no. 1662, Sept. 9, 1927, pp. 477–478, 3 figs. New models include low-built 12-hp. four-cylinder, and light six-cylinder.

Lincoln. The Lincoln Car. Auto-Motor Jl., vol. 32, no. 1395, Sept. 29, 1927, pp. 811–814, 10 figs. A V-eight engine; mechanical six-brake system; many interesting mechanical details; fine cooling and lubrication systems.

Mathis. The 10 H.P. Mathis. Auto-Motor Jl., vol. 32, no. 36, Sept. 8, 1927, pp. 745–747, 6 figs. New model with various improvements; some fine bodywork; most roomy and comfortable saloon; increased value.

Olympia Show, London. Some Accessories to Be Seen. Auto-Motor Jl., vol. 32, no. 40, Oct. 6, 1927, pp. 827–836, 39 figs. Brief description of automobile accessories exhibited at annual show.

Painting. Superiorities of Lacquer Finish in Automobile Painting, M. C. Hillick. Automotive Mfr., vol. 69, no. 6, Sept. 1927, pp. 21–22. How one-day paint job is produced; part produced by perfect surface preparation; durability and luster; polishing.

Paris Show. Three French Cars at Paris Show Using American Engines, W. F. Bradley. Automotive Industries, vol. 57, no. 16, Oct. 15, 1927, pp. 574–575, 2 figs. Donnet fitted with Continental, Sizaire-Berwick has Lycoming eight and Sizaire Bros. have adopted Willys-Knight; show largest in history with 1200 exhibitors.

Rover. A Rover Two-Litre Six. Autocar, vol. 59, no. 1661, Sept. 2, 1927, pp. 417–421, 11 figs. Medium-sized model at moderate price added to existing range for 1928; roomier coachwork for 10–25 hp. car. See also Auto-Motor Jl., vol. 32, no. 36, Sept. 8, 1927, p. 752, 3 figs.

Rugby. The Rugby Six. Auto-Motor Jl., vol. 32, no. 35, Sept. 1, 1927, pp. 725–727. An American car of distinctive design and performance; "top-gear" vehicle with very flexible engine; good suspension and braking.

Sensaud de Lavaud. Sensaud De Lavaud Novelty Autocar, vol. 59, no. 1664, Sept. 23, 1927, pp. 561–564, 10 figs. New 6-cylinder Sensaud de Lavaud has special transmission automatically providing correct gear ratio according to the resistance encountered by the road wheels; frame, instead of being an assembly of side rails and cross members riveted or bolted together, is one-piece casting in Alpax metal, which is an alloy of aluminum and silicon; other features.

Shock Absorbers. Shock Absorbers. Autocar, vol. 59, no. 1665, Sept. 30, 1927, pp. 646–648, 12 figs. Useful hints on care, maintenance, and adjustment of more popular varieties of shock absorbers.

Singer. Singer Sunshine Saloons. Autocar, vol. 59, no. 1662, Sept. 9, 1927, pp. 465–467, 9 figs. Closed cars top of which can be folded back by means of winding key form special feature in a program that also includes improvements in the senior and junior and six-cylinder chassis.

Standard Motors. Standard Revives Small Car. Autocar, vol. 59, no. 1662, Sept. 9, 1927, pp. 472–475, 10 figs. Range for 1928 embraces two types of medium-sized fours and sixes and an entirely new 8.9-hp. four-cylinder model with wide choice of coachwork. See also Auto-Motor Jl., vol. 32, no. 36, Sept. 8, 1927, p. 754.

Star. Star Cars for 1928. Autocar, vol. 59, no. 1664, Sept. 23, 1927, pp. 575–576, 5 figs. Introduction of a new six-cylinder 18–50-hp. model and continuation of the 12–40-hp. four-cylinder and 20–60-hp. six-cylinder types.

Sunbeam. Concerning Sunbeams. Autocar, vol. 59, no. 1664, Sept. 23, 1927, p. 577, 5 figs. Unaltered program, but some minor modifications; development of the 16-hp. flexible-fabric four-door saloon.

The 20 H.P. Sunbeam Six. Auto-Motor Jl., vol. 32, no. 37, Sept. 15, 1927, pp. 767–770, 11 figs. Complete details of new car being put out in several models, including 5-passenger touring and Weymann saloon.

Tires. Tyres for 1928. Autocar, vol. 59, no. 1665, Sept. 30, 1927, pp. 650–651, 20 figs. Advance of well-base rim, and introduction of a new pattern; electrical deposition of rubber; remarkable longevity of covers; medium pressures for inflation; road adhesion and tread patterns.

Triumph. The Super-Seven Triumph. Autocar, vol. 59, no. 1663, Sept. 16, 1927, pp. 511–513, 8 figs. Describes new 4-cylinder 7-hp. 4-seater car recently announced by Triumph Co.; features include hydraulically operated brakes and camshaft carried in three bearings.

Vauxhall. The New Vauxhall Six-Cylinder. Autocar, vol. 59, no. 1665, Sept. 30, 1927, pp. 630–634, 11 figs. Full details of 20–60 hp. car, produced specially to provide motorists with a roomy, high-grade comfortable car at an extremely attractive price.

Vulcan. Free-Wheel Vulcans. Autocar, vol. 59, no. 1665, Sept. 30, 1927, pp. 594–595, 5 figs. Easy gear-change device an optional extra on 1928 cars; original fabric coachwork on six-cylinder chassis.

Wheels, Interchangeable. Interchangeable Wood Wire and Disk Wheels Now Available. Automotive Industries, vol. 57, no. 16, Oct. 15, 1927, pp. 584–585, 3 figs. Are of demountable type and fit same hub; greater strength and lightness are features; marketed for original equipment by Motor Wheel Corp.

Wolseley. New 12–32 hp. Wolseley. Autocar, vol. 59, no. 1665, Sept. 30, 1927, pp. 657–658, 7 figs. Addition to range of four-cylinder models with an engine of just over $1^1/_2$-litre capacity and a four-speed gear box.

Wolseley Straight-Eight. Autocar, vol. 59, no. 1663, Sept. 16, 1927, pp. 519–522, 8 figs. Medium-sized car, with multi-cylinder engine to give smoothness and silence of running, produced at a moderate price.

AUTOMOTIVE FUELS

Chemistry of. Contributions of Chemistry to Automotive Transportation, J. B. Hill. Automotive Mfr., vol. 69, no. 6, Sept. 1927, pp. 13–15. Refers particularly to fuels, including increased recoveries, cracked gasolines, anti-knock fuels, benzols and synthetic fuels.

Production from Coal. High-grade Motor Fuel from German Brown Coal. Petroleum Times, vol. 18, no. 454, Sept. 24, 1927, p. 576. Extensive development in distillation of brown coal primarily for liquid fuel in Germany.

Sources. Many Future Sources of Motor Fuel, J. C. Morrell and G. Egloff. Oil & Gas Jl., vol. 26, no. 18, Sept. 22, 1927, pp. 202 and 400–404. Present status of motor-fuel manufacture with a discussion of probable future developments; manufacturing operations necessary to convert raw material into fuels suitable for operation of internal-combustion engines; explanation of characteristic of motor fuels from standpoint of performance; new developments in engine design from standpoint of conservation are equal in importance to potential supplies of raw material.

Testing Apparatus. New Apparatus Gages Anti-Knock Characteristics of Fuel. Automotive Industries, vol. 57, no. 16, Oct. 15, 1927, pp. 588–589, 2 figs. Consists of single-cylinder water-cooled engine fitted with Midgley bouncing pin device and is designed primarily for refiners distributing ethyl gasoline.

AVIATION

National Air Races, Spokane. The 1927 National Air Races. Aviation, vol. 23, no. 15, Oct. 10, 1927, pp. 866–871, 15 figs. Features of 1927 annual air races with brief details of planes and engines used.

B

BEARINGS, BALL

Fit of. Ball-Bearing Fits (Kugellagerpassungen im Automobilbau), H. Törnebohm. Maschinenbau, vol. 6, no. 18, Sept. 15, 1927, pp. 904–906, 2 figs. Compares practice of various countries and finds that some firms (particularly European) are over-precise; discusses rational selection of fit.

BLAST FURNACES

Improved. Wheeling Steel Corporation's New Furnace. Blast Furnace & Steel Plant, vol. 15, no. 9, Sept. 1927, pp. 444–445, 6 figs. Blast furnace features novel development in gas wasting; capacity equal to production of largest furnaces; bells operated by electric hoists.

Practice. The Theory of the Blast-Furnace Process, F. Wüst. Iron & Coal Trades Rev., vol. 115, no. 3109, Sept. 30, 1927, pp. 494–495, 2 figs. Presents arguments showing that manganese, silicon, and phosphorus cannot be taken up by iron in any considerable quantity in blast-furnace bosh.

Oxides Reduction. On the Theory of the Blast-Furnace Process, F. Wüst. Engineering, vol. 124, no. 3220, Sept. 30, 1927, pp. 436–438, 2 figs. Presents arguments to show that manganese, silicon, and phosphorus cannot be taken up by iron in any considerable quantity in blast-furnace bosh. Paper presented before Iron & Steel Inst.

BOILER FIRING

Pulverized Coal. Steam Plant Firing with Pulverized Coal (La chauffe des générateurs de vapeur au charbon pulverisé), M. Emanaud. Technique Moderne, vol. 19, no. 18, Sept. 15, 1927, pp. 561–566, 8 figs. General and elementary review of advantages of pulverized-coal firing, methods and equipment used in pulverizing of coal and its subsequent treatment and transportation, paying special attention to French processes and apparatus.

BOILER FURNACES

Water Screens and Walls. Plants Give Data on Water Screens and Walls. Power Plant Eng., vol. 31, no. 19, Oct. 1, 1927, pp. 1026–1027, 6 figs. Heat absorption equivalent to over 2000 per cent rating has been measured in water screens which have revolutionized furnace construction in the past few years.

Well-Type. Well-Type Furnace Tests at Huntley Station, H. M. Cushing and R. P. Moore. Power Plant Eng., vol. 31, no. 21, Nov. 1, 1927, pp. 1135–1137, 2 figs. At Charles R. Huntley station, 1250-hp. boilers show unit efficiencies in excess of 85 per cent.

BOILER OPERATION

CO_2 and Uptake-Temperature Records. Guiding Boiler Operation from CO_2 and Uptake Temperature, G. B. Mulloy. Power, vol. 66, no. 18, Nov. 1, 1927, pp. 660–662, 4 figs. Continuous record of CO_2 and boiler uptake temperatures, proper sizing of coal, maintaining boilers clean and tight, are saving Armour & Co. annually at least 90,000 tons of coal.

BOILERS

Electric. The Sulzer Electric Boiler. Sulzer Tech. Rev., no. 3, 1927, 19 pp., 31 figs. Describes different types of electric boilers, and their uses, and lists some installations.

Fuel Economy. Fuel Economizers for Heating Boilers, E. Williams. Domestic Eng. (Chicago), vol. 12, no. 1, Oct. 1, 1927, pp. 30–32, 5 figs. Use of fuel economizers on high-pressure boilers to absorb large portion of heating contained in flue gases before they enter chimney; successful use for this purpose has led to their adoption for heating boilers.

Locomotive. See LOCOMOTIVE BOILERS.

Waste-Heat. Waste Heat Boiler Application, J. B. Crane. Blast Furnace & Steel Plant, vol. 15, no. 9, Sept. 1927, pp. 448–449 and 453, 5 figs. A concise recital of the economical and practical aspects entering into the selection and installation of boilers for the recovery of waste heat.

BOILERS, WATER-TUBE

Humboldt. High-Duty Boiler Plants with Vertical Tubes and Horizontal Upper Drum (Hochleistungs-Steilrohrkesselanlagen mit längsliegenden Obertrommeln), H. F. Lichte. Centralblatt der Hütten u. Walzwerke, vol. 31, nos. 30 and 32, July 27 and Aug. 10, 1927, pp. 415–418 and 447–451, 19 figs. Table of characteristics of principal types of Humboldt water-tube boilers; discussion of their construction and principles of operation, firing with pulverized coal, and preheating of feedwater.

BONUS SYSTEMS

California Transit Co. Drivers Like This Bonus Plan, M. J. Koitzsch. Operation & Maintenance, vol. 36, no. 3, Sept. 15, 1927, pp. 14–16, 9 figs. System devised by secretary of California Transit Co., Oakland, results in fewer accidents and close adherence by drivers to rules; bonus paid semi-annually, according to mileage and number of demerits.

BORING MACHINES

Design. Three-spindle High-precision Jig Boring Machine. Machy. (Lond.), vol. 31, no. 782, Oct. 6, 1927, pp. 16–18, 4 figs. Developments in design of boring machines by Société Génévoise, London.

BRASS

Heat Treatment. Heat Treating Brass Parts in Process, K. C. Monroe. Am. Mach., vol. 67, no. 13, Sept. 29, 1927, pp. 491–494, 6 figs. Importance of proper heat treatment on working and finishing qualities of brass employed for drawing and stamping purposes as demonstrated in experiments made by Bridgeport Brass Co.; experiments were made on regular process work over long period of time, and showed conclusively that annealing of brass between drawing operations must be considered as major operation requiring close attention, and that final product of accuracy and high-grade finish cannot be obtained without proper control of this detail.

Yield Point. Behavior of Brass at Yield Point (Uber das Verhalten von Messing an der Streckgrenze), W. Köster. Zeit. für Metallkunde, vol. 19, no. 8, Aug. 1927, pp. 304–310, 9 figs. Buckling effect, at yield point, of heterogeneous copper-zinc alloys; influence of crystalline structure on form of elongation curve at yield point; heat treatment improves yield-point behavior of bars which had been previously stretched beyond elastic limit.

C

CABLEWAYS

Aerial, Passenger. Recent Aerial Cableways for Transportation of Passengers (Die neuen Seilschwebebahnen zur Personenbeförderung), R. Hanker. Zeit. des Osterr. Ingenieur- u. Architekten-Vereines, vol. 79, no. 35–36, Sept. 2, 1927, pp. 321–326, 12 figs. Design, construction and operation of recent Central-European passenger cableways, 2 to 3 km. in length, 600 m. to 1100 m. difference in elevation of ends; discusses sensations of passengers, safety, economic aspects and prospects.

Ore Handling. A Funicular Cableway on the Island of Cyprus (Le funiculaire aérien de l'Ile de Chypre pour le transport de l'amiante), G. Brillo. Génie Civil, vol. 91, no. 11, Sept. 10, 1927, pp. 253–255, 13 figs. Description of funicular for transportation of asbestos fiber from elevation of about 1300 m. to sea level at Limassol, 29.4 km. long; details of steel towers, costs.

Protective Bridges, Design of. Designing Girders of Protective Bridges of Overhead Cableways Against Shock of a Falling Car (Berechnung von Schutzbrückenträgern bei Drahtseilbahnen gegen den Stoss abfallender Förderwagen), J. Wörner. Fördertechnik u. Frachtverkehr, vol. 18, no. 19, Sept. 2, 1927, pp. 309–311. Mathematical analysis with numerical example.

CARBURETORS

Aircraft. Aircraft Carburetors, L. S. Hobbs. Soc. Automotive Engrs.—Jl., vol. 21, no. 4, Oct. 1927, pp. 409–412. Factors affecting design of aircraft carburetors; space restrictions; problems introduced by use of superchargers; fuel-feed control; ice formation in intake system; heating media available for water-cooled engines, etc.

CARS, FREIGHT

Curve Resistance. Freight Train Curve Resistance on a One-Degree Curve and on a Three-Degree Curve, E. C. Schmidt. Univ. of Ill.—Bul., vol. 24, no. 45, July 12, 1927, 47 pp., 15 figs. Results of tests made with five freight trains on one-degree and three-degree curves; results relate exclusively to resistance of cars composing trains, and apply only to freight trains with four-wheeled trucks.

Narrow-Gage, Heavy. Heavy Loads on a Narrow-Gauge Line. Ry. Engr., vol. 49, no. 573, Oct. 1927, pp. 376–377, 6 figs. Describes 2 special freight cars for carrying heavy castings for a gyratory crusher for the Chile Exploration Company from the port of Mejillones to Chuquicamata, on the 2-ft. 6-in. gage.

CARS, PASSENGER

London, Midland & Scotland Railway. New First-Class Corridor Coaches, London Midland & Scottish Railway. Ry. Gaz., vol. 47, no. 12, Sept. 16, 1927, p. 337. Details of new passenger cars in which ordinary side doors admitting to each compartment from platform are abolished, and entry and exit are by way of end vestibules leading into the corridor; by this arrangement, draft from door joints is eliminated, and a much better look-out is obtained by the larger windows provided.

CAST IRON

Alloys. Uses of Nickel and Chromium Cast Iron with Special Reference to the U.S.A. (Ueber die Verwendung von nickel- und chromlegiertem Gusseisen mit besonderer Berücksichtigung der Vereinigten

Staaten von Nordamerika), P. Oberhoffer and E. Piwowarsky. Giesserei, vol. 14, no. 35, Aug. 27, 1927, pp. 585–592. Authoritative summary and comments on achievements of Americans in technology of cast-iron alloys; also original tests, chemical and metallographic studies by authors.

Diesel Engines. Properties and Heat Treatment of Cast Iron for Diesel Engines, F. B. Coyle. Am. Soc. for Steel Treat.—Trans., vol. 12, no. 3, Sept. 1927, pp. 446–465, 18 figs. Necessity for higher quality cast iron to withstand higher working temperatures and higher pressures in Diesel-engine operations; author believes that research should be directed toward compositions which have a lower carbon and silicon content than have usually been produced in the past.

Pearlitic. Evolution of Pearlitic Cast Iron (Entwicklung des Perlitgusses), Meyersberg. V.D.I. Zeit., vol. 71, no. 41, Oct. 8, 1927, pp. 1427–1432, 14 figs. History of process since 1920, review of tests of mechanical properties showing its great superiority over other sorts of cast iron; data on its workability, resistance to abrasion, uniformity of structure, flawlessness, density, etc.

Seasoning. The Effect of Seasoning on Cast Iron, F. E. Cardullo. Machy. (N. Y.), vol. 34, no. 3, Nov. 1927, pp. 199–200, 1 fig. Effect of slow cooling; changes in crystalline form; changing structure by annealing; time required for seasoning; outdoor seasoning.

Workability. Hardness and Workability of Cast Iron (Ueber Härte und Bearbeitbarkeit im Gusseisen), W. Melle. Giesserei-Zeitung, vol. 24, no. 17, Sept. 1, 1927, pp. 485–486, 4 figs. Importance of cutting tests for special, high-grade cast iron and its determination by means of Kessner hardness-testing drill; defines workability in terms of depth of boring per 100 revolutions under strictly specified conditions and demonstrates, by series of experiments, that it is a function of Brinell hardness.

CASTING

Centrifugal. Flat Steel from Cammen Centrifugally Cast Bars. Iron Age, vol. 120, no. 16, Oct. 20, 1927, p. 1100, 2 figs. Experiments on commercial scale of producing finished steel from centrifugally cast bars were carried out at plant of large American steel company.

CASTINGS

Cleaning. Cleaning Castings with a Blast of Sand, E. G. Brock. Can. Foundryman & Electroplater, vol. 18, no. 8, Aug. 1927, pp. 7–9. Whether in form of room, table or barrel, sand-blast equipment is steadily gaining approval of foundry executives who seek to attain maximum production at minimum cost.

Sandblasting Forged and Treated Parts, C. J. Stiers. Forging-Stamping-Heat Treating, vol. 13, no. 9, Sept. 1927, pp. 367–368. Use of sandblasting for cleaning forgings, castings, drills, connecting rods and many heat-treating parts; choosing equipment for particular shape of piece and tonnage.

CENTRAL STATIONS

Automatic Boiler Control. Hagan Automatic Boiler Control. Engineering, vol. 124, no. 3217, Sept. 9, 1927, pp. 325–327. Problems at Port Morris power station of N. Y. Central R. R. and description of automatic boiler control employed.

Design. A Departure from Standard Station Design. Elec. Light & Power, vol. 5, no. 9, Sept. 1927, pp. 21–23. Describes new station of Waukegan Generating Co., Waukegan, Ill.; design of this station embodies departure from standard American generating-station development.

Diesel-Engined. The 15,000-kw. Diesel Generator of the Hamburg Electric Works (Der 15000 kw-Dieselmotor-Generator der Hamburgischen Electricitäts-Werke). Elektrotechnische Zeit., vol. 48, no. 18, May 5, 1927, pp. 606–612, 9 figs. Details of nine-cylinder (86 cm. diameter) Diesel engine, layout of central station and electrical equipment.

Modernizing a Municipal Light Plant, F. H. Poehlman. Power, vol. 66, no. 15, Oct. 11, 1927, pp. 546–547, 5 figs. Grove City, Pa., builds new light plant; old gas engines replaced by Diesels; fuel cost is cut one-half.

Plant Construction. Organization for Construction, A. S. Douglass. Elec. World, vol. 90, no. 15, Oct. 8, 1927, pp. 731–737. Detroit Edison Co. set-up makes construction an integral function; executive and engineering decisions on design essential; necessity for coördination of material and equipment deliveries with construction progress.

CHIMNEYS

Building Codes. Chimney Requirements Established by Kansas City's Building Codes. Sheet Metal Worker, vol. 18, no. 15, Aug. 26, 1927, pp. 558–559. Reprint of the section covering chimneys, flues, woodwork around chimneys, and fireplaces, of building code adopted by Kansas City; as this is regarded as a model code, it may be accepted as setting practical standards of good practice.

COAL HANDLING

Unloading. Unloading Coal from Railway Cars Kohlenentladung aus Eisenbahnwagen), C. Weicken. Fördertechnik u. Frachtverkehr, vol. 19, no. 17, Aug. 19, 1927, pp. 293–299, 8 figs. Comparative study of efficiency and economy of unloading by manual labor, bucket conveyor, automatic grab or tipping platform, for various hourly rates and total volumes.

COMBUSTION

Control. The L. and N. Automatic Combustion Control System. Eng. & Boiler House Rev., vol. 41, no. 3, Sept. 1927, pp. 109–112, 2 figs. Describes Leeds and Northrup system of automatic combustion control, in which more general use is made of electrical control, and steam-flow variations in main are utilized to operate whole system electrically.

CONVEYORS

Belt. Belt Conveyors Used in Construction of Wanaque Dams, A. H. Pratt. Contractors & Engrs. Monthly, vol. 15, no. 2, Aug. 1927, pp. 55–62, 11 figs. Describes belt conveyor system used in connection with various operations in construction of dams for Wanaque Reservoir, New Jersey; about 2$^1/_2$ mi. of belt conveyor were used.

Power Requirements and Tensile Stresses in Belts of Belt Conveyors (Gurtspannkräfte und Leistungsbedarf von Gurtförderern), Heumann. Fördertechnik u. Frachtverkehr, vol. 18, no. 19, Sept. 2, 1927, pp. 311–314, 2 figs. Theoretical analysis, taking into account resistance due to deflection of belt, illustrated with numerical example.

Increasing Factory Capacity. Conveyor System Doubles Capacity, B. Finney. Iron Age, vol. 120, no. 14, Oct. 6, 1927, pp. 933–936, 6 figs. Total output of the finishing and assembling departments of the Monitor Furnace Co., Cincinnati, manufacturer of Caloric heating furnaces, has been increased 100 per cent by the installation of a conveying system for transporting rough castings through the finishing operations and thence to warehouse to await shipment to customers; in addition, mechanical handling of material has cut down normal working force by 11 men, a considerable saving in labor cost thereby being effected; furthermore, use of conveyors has brought about other economies which, considered on an annual basis, amount to an impressive sum.

Platform. Overhaul by Conveyor Platform, H. W. Blake. Am. Mach., vol. 67, no. 15, Oct. 13, 1927, pp. 577–578, 2 figs. European electric railways adopt Henry Ford's construction methods in overhaul of their equipment; entire shop based on this principle designed by London Underground Electric Railway.

COPPER ALLOYS

Copper-Magnesium. The Copper-Magnesium Alloys, W. T. Cook and W. R. D. Jones. Inst. of Metals—Advance Paper, no. 434, 1927, 22 pp., 7 figs. Investigation on the forging of copper-magnesium alloys; ductility of alloys depends primarily on the forging temperature; addition of copper to magnesium up to about 2 per cent is beneficial.

Copper-Tin. The Equilibrium Diagram of Copper-Tin Alloys Containing from 10 to 25 Atomic Per Cent of Tin, A. P. Raper. Inst. of Metals—Advance Paper, no. 437, 1927, 15 pp., 20 figs. This investigation on the copper-tin alloys forms a continuation of the work done by Stockdale on this system; alloys have been examined both by thermal and micrographic analysis, and results obtained have confirmed in many respects the classical work of Roberts-Austen and Heycock and Neville.

CORES

Chaplets for. Studies Use of Chaplets, J. Varlet. Foundry, vol. 55, no. 21, Nov. 1, 1927, pp. 858–860, 10 figs. Experiments undertaken to determine difference between chaplets coated with tin and chaplets of mild steel, which may represent either double chaplets or bar chaplets, either of small or large dimensions used in cored castings for wedging and supporting cores. See also Foundry Trade Jl., vol. 36, no. 576, Sept. 1, 1927, pp. 191–195, 10 figs.

CORROSION

Iron in Water. Corrosion of Iron in Drinking Water (Die Korrosion von Eisen unter Wasserleitungswasser), J. Tilmans, P. Hirsch and W. Weintraud. Gas u. Wasserfach, vol. 70, nos. 35, 36, 37 and 84, Aug. 27, Sept. 3, 10 and 17, 1927, pp. 845–849, 877–883, 898–904 and 919–925. Mechanism and rate of rusting; original elaborate series of experiments on effect of hydrogen-ion concentration and oxygen content on rate of corrosion of iron in water at rest and in motion, details on harmful effect of oxygen; practical advice.

COST ACCOUNTING

Building Construction. Keeping the Costs on a Building Job. Eng. & Contracting, vol. 66, no. 5, May 1927, pp. 215–225. How Wells Brothers Construction Co., Chicago, are simplifying cost finding on large project with system readily adapted to work of any magnitude; notes on construction methods.

CRANES

Bridge Erection. Erecting Cranes for the Sydney Harbour Bridge. Engineer, vol. 144, no. 3746, Oct. 28, 1927, pp. 475–477, 10 figs., partly on supp. plate and p. 484. Crane equipment used for placing sections of arch in position; each equipment consists of a structural undercarriage extending across top booms of arch and carrying self-contained crane unit capable of being traversed across undercarriage; it can therefore be made to serve whole width of bridge.

Cross-Winding. Cross-winding in Traveling Cranes. Mechanical World, vol. 82, no. 2123, Sept. 9, 1927, p. 181, 1 fig. Causes of cross-winding in traveling cranes and methods of prevention.

Electric. Electric Crane Practice, W. E. Richardson. Elec. Rev., vol. 101, no. 2600, Sept. 23, 1927, pp. 497–498. The maintenance of electric cranes in the steel mill, some of the causes of breakdowns and suggestions for their prevention.

Electric Motors for. The New Loading Crane at the Petit-Huningue Wharf Near Basle, E. Altschul. Brown Boveri Rev., vol. 14, no. 9, Sept. 1927, pp. 223–227, 4 figs. Description of cranes equipped with single-phase commutator motors, used for loading and unloading vessels at Petit-Huningue wharf near Basel.

Jib. Level-Luffing Jib Cranes, E. G. Fiegehen. Engineer, vol. 144, no. 3737 and 3738, Aug. 26 and Sept. 2, 1927, pp. 222–224 and 246–249, 11 figs. Study of various types.

Railway. Modern Gantry Crane for Lifting Wagons and Locomotives (Neuzeitlicher Bockkran für die Unterhaltung von Wagen und Lokomotiven), M. Osthoff. Organ für die Fortschritte des Eisenbahnwesens, vol. 82, no. 17, Sept. 15, 1927, pp. 319–324, 5 figs. Description of recent German models, their operation, costs, etc.

Traveling. Traveling Cranes (Untersuchungen am Laufkran), C. Stockmann. Fördertechnik u. Frachtverkehr, vol. 20, nos. 15, 16, 18 and 19, July 22, Aug. 5, Sept. 2 and 16, 1927, pp. 261–264, 283–287, 314–317 and 330–335, 26 figs. Theoretical and experimental study of crane resistance; mechanical theory of traveling cranes; description of experiments; calculation of resistances due to acceleration, lifting, and friction at rim and loss of traversing wheel, results of experiments and tables for computing wheel pressures for various conditions.

CRANKSHAFTS

Honing. External Cylindrical Honing, L. A. Becker. Soc. Automotive Engrs.—Jl., vol. 21, no. 4, Oct. 1927, pp. 377–381, 4 figs. Development of machine for honing bearing surfaces of crankshafts; variables to be controlled in crankshaft honing; honing is said to produce bearing surface smoother and more true to form than can be produced by grinding alone or by grinding and polishing; this is said to make possible smaller bearing clearances than are generally needed, to eliminate usual initial wear, and to reduce bad effects of oil dilution.

CUPOLAS

Explosions. Explosions in Cupola Practice and Their Causes (Explosonen und deren Ursfachen beim Cupolofenbetrieb). Zeit. für die gesamte Giessereipraxis, vol. 48, no. 36, Sept. 4, 1927, pp. 315–316. Detailed description of an explosion, observed by author, due to large volume of molten material having been emptied into pit containing rain-water and apparently forming oxyhydrogen gas; explosions may also be caused by accumulation of gases on top of molten mass, due to imperfect evacuation, as in rainy weather, etc., also to accumulation of explosive gases in wind box when blast is temporarily interrupted; recommends special exhaust ventilation.

Firing. The Auxiliary Powdered Coal Firing of Cupolas. Foundry-Trade Jl., vol. 36, no. 579, Sept. 22, 1927, pp. 259–261, 1 fig. Review of experimental work and results.

Hot-Blast Application. Hot Blast Applied to the Cupola, F. K. Vial. Iron Age, vol. 120, nos. 16 and 17, Oct. 20 and 27, 1927, pp. 1071–1076 and 1155–1156, 4 figs. Oct. 20: Carbon monoxide drawn from a point below charging door is burned in combustion chamber preheating the blast. Oct. 27: Consumption of fuel and air reduced 20 per cent; blast pressure only one-half that required in ordinary practice.

Pulverized Coal, Use of. Effect of Use of Pulverized Coal on the Melting Process in Foundry Cupolas (Der Einfluss der Kohlenstaubzusatzfeuerung auf den Schmelzvorgang im Giessereikuppelofen), A. Kaiser and P. Bardenheuer. Stahl u. Eisen, vol. 47, no. 34, Aug. 25, 1927, pp. 1389–1395, 3 figs. Use of pulverized coal in blast furnaces; detailed account, including material and heat balance, of comparative cupola tests at Babcock iron foundry at Oberhausen, which showed that, with reduction in charge coke from 11 to 7 per cent and an addition of 0.8 to 0.9 per cent of pulverized coal, overall efficiency and economy of melting was increased by about 30 per cent.

D

DIE CASTING

Dies for. Pressure Dies for Die-Casting. Machy. (Lond.), vol. 30, no. 777, Sept. 1, 1927, pp. 685–688, 5 figs. Die design governed by degree of intricacy and knowledge of likely number of castings, and by necessary speed of casting; other considerations to be kept in mind; typical examples.

DIES

Die Blocks, Heat Treatment of. Heat Treatment of Die-blocks. Machy. (Lond.), vol. 31, no. 782, Oct. 6, 1927, pp. 9–11. Tentative practice approved by recommended practice committee of American Society for Steel Treating.

Forming. Drawing, Forming and Piercing Dies, F. A. Stanley. West. Machy. World, vol. 18, no. 9, Sept. 1927, pp. 431–433, 5 figs. Describes some of press-tool work of Poulsen & Nardon, Los Angeles, Cal.

DIESEL ENGINES

Allen. Auxiliary Generating Machinery. Brit. Motorship, vol. 8, no. 90, Sept. 1927, pp. 228–229. New design of Allen Diesel engine with monobloc cylinders whereby cylinder bases from single casting, although top portion of jackets are separated to allow for expansion; this applies to two-cylinder and three-cylinder models; with four-cylinder engines two castings are employed, each comprising single base for pair of jackets in which are inserted removable liners.

Automotive Purposes. Diesel Engine Position. Autocar, vol. 59, no. 1661, Sept. 2, 1927, pp. 413–416, 9 figs. Article by engineer who is closely in touch with Continental design reviews present position, setting forth general principles and advantages of Diesel and semi-Diesel engines, and indicating difficulties to be overcome.

Development of the Automotive Diesel Oil-Engine.

C. L. Cummins. Soc. Automotive Engrs.—Jl., vol. 21, no. 4, Oct. 1927, pp. 388–392, 8 figs. Outlines Diesel-engine development; various types of fuel injection are classified and several advantages and disadvantages summarized; steps in development of Cummins oil engine; objects sought in design and construction and operation of injector mechanism developed to accomplish those objects.

Auxiliary. The Ruston and Hornsby Five-Cylinder Auxiliary Engine. Brit. Motor Ship, vol. 8, no. 89, Aug. 1927, pp. 180–182, 9 figs. Eight 275-b.hp. units for large refrigerated motor ships.

Beardmore. Beardmore High-speed Oil Engines. Motor Transport, vol. 45, no. 1174, Sept. 12, 1927, pp. 307–309. Progress in development of smaller and more flexible power units for transport vehicles as exemplified by 100-b.hp. model.

Bessemer. New Bessemer Diesel Has Many Refinements. Oil Engine Power, vol. 5, no. 10, Oct. 1927, pp. 671–675, 7 figs. Unusual freedom from vibration and a noteworthy simplicity of design characterizes the new Model MR-8 Bessemer 1500-hp. oil engine recently completed by the Bessemer Gas Engine Co.; bore of 18 in. and a stroke of 22 in. operating at normal speed of 300 r.p.m.

Cylinder Lubrication. Lubricating Power Cylinders of Diesel Engines, W. O. Northcutt. Mech. Eng., vol. 49, no. 10, Oct. 1927, pp. 1068–1070, 3 figs. Purpose of paper is to offer constructive criticism of present methods of applying lubricating oil to power cylinders of Diesel engines, and to recommend a method which is believed to be an improvement; discussion, data and conclusion are based on an experimental study of this phase of Diesel-engine lubrication; report of tests conducted show ill effects of oxidation.

Double-Acting. German Double Acting Diesel Engines. Mar. Eng. & Shipg. Age, vol. 32, no. 10, Oct. 1927, pp. 562–564, 2 figs. New types of Diesel engines which are displacing single acting machinery in the German shipyards.

High-Speed. Developments in High-Speed Diesel Engines. Power Plant Eng., vol. 31, no. 18, Sept. 15, 1927, pp. 987–988, 3 figs. New line of Fairbanks-Morse Diesel engines in speeds ranging from 500 to 800 r.p.m. and ratings from 30 to 180 hp. show trend in design.

Ignition and Combustion. Recent Views on Ignition and Combustion in Diesel Engines (Neuere Anschauungen über Zünd- und Verbrennungsvorgänge in Dieselmotoren), Sass. V.D.I. Zeit., vol. 71, no. 37, Sept. 10, 1927, pp. 1287–1292, 8 figs. Review of recent research work and some new data from A.E.G. laboratories, which apparently disprove theory of gasification of oil before ignition,and indicate direct ignition of liquid phase; also discussion of time lag and chemical combustion mechanisms.

Installation Costs. Installation Costs of Diesel Engines, E. J. Kates. Power Plant Eng., vol. 31, no. 19, Oct. 1, 1927, pp. 1043–1044. Data showing that industrial-plant installation costs are lower than those of central stations.

Liner Wear. Liner Wear on Diesel Engines, C. G. A. Rosen. Pac. Mar. Rev., vol. 24, no. 10, Oct. 1927, pp. 466–467, 3 figs. Causes of liner wear said to involve influence of heat, pressure and speed on lubrication, metals and design; these factors also related to quality of fuel oil employed.

M.A.N. An American Double-Acting Engine. Brit. Motorship, vol. 8, no 90, Sept. 1927, pp. 202–206, 5 figs. Describes 3600-boiler hp. Nelseco-M.A.N. four-cylinder two-stroke double-acting motor to be installed in converted steamer "Wilscox," said to represent highest engine output of any marine Diesel motor hitherto constructed in United States.

Tests of Hamilton-M.A.N. Diesel Engine. Mar. Eng. & Shipg. Age, vol. 32, no. 10, Oct. 1927, p. 565. Results of shop tests of Hooven-Owens-Rentschler engine constructed for Shipping Board Diesel conversion program for installation in 9600-ton cargo ship Seminole.

Marine. The Machinery of the Liner "Bermuda." Brit. Motor Ship, vol. 8, no. 89, Aug. 1927, pp. 161–163, 2 figs. First Doxford engines with pistons of unequal strokes.

Nelseco. Power for Naval Base, Furnished by Nelseco Diesel Engines. Oil Engine Power, vol. 5, no. 10, Oct. 1927, pp. 678–680, 6 figs. Describes various Nelseco engines installed by Peruvian Government at Naval Base at Callao, to supply power.

Supercharging. Increasing Efficiency of Four-Stroke Diesel Engines by Means of Precompression of Combustion Air (Leistungssteigerung an Viertakt-Dieselmotoren durch Vorverdichtung der Verbrennungsluft mittels Aufladeturbogebläsen), W. Salvisberg. Elektrotechnik u. Maschinenbau, vol. 45, no. 39, Sept. 25, 1927, pp. 813–819, 7 figs. Discusses supercharging of engines, with or without increase in compression space, by means of turbo blowers, using exhaust air; describes Brown-Boveri Diesel unit so operated.

Valves. Care of Diesel Engine Valves, E. Ingham. Gas & Oil Power, vol. 23, no. 265, Oct. 6, 1927, p. 1. Safe and satisfactory running of Diesel engines depends in large measure on their careful maintenance; importance of perfect adjustment and condition of fuel valve.

DURALUMIN

Uses of. The Use of Duralumin in the Manufacture of an All-Metal Artificial Limb, N. F. Parkinson. Eng. Jl., vol. 10, no. 10, Oct. 1927, pp. 451–458, 7 figs. Refers to its use for this purpose by Canadian government and gives some detailed information as to properties of duralumin; development of limb manufacture to meet war conditions; properties of duralumin and effect of heat treatment, work and corrosion; effect of mechanical work and annealing temperatures.

E

ELECTRIC DRIVE

Influence on Industry. Conditions and Effects of Electric Drives as Compared with Older Methods, R. H. Rogers. West. Machy. World, vol. 18, no. 9, Sept. 1927, pp. 434–436. Outlines some of broader and perhaps less obvious effects of electricity in industry; retirement of industrial plants to large industrial centers; change in conditions for personnel of industry; release of space and capital for application to production; conservation of natural resources; high rate of production that now prevails through agency of electric power; production costs; release of space and capital for application to production.

ELECTRIC FURNACES

Annealing. Electric Furnace Used in Annealing Cylinders for Air Cooled Engines, I. S. Wishoski. Fuels & Furnaces, vol. 5, no. 9, June 1927, pp. 1199–1202, 2 figs. Electric furnace of recuperative return type with automatically operated pusher mechanism proves very efficient in annealing automobile-engine cylinders.

Pot-Type. Low and High Temperature Electric Pot Furnaces, E. Fleischmann. Indus. Mgmt. (N. Y.), vol. 74, no. 3, Sept. 1927, pp. 177–182, 9 figs. Points out major points of importance in selection of pot-type furnaces for either low or high-temperature work and reasons therefor.

Steel. High-Frequency Induction Melting, D. F. Campbell. Iron & Steel Inst.—Advance Paper, no. 1, Sept. 1927, 8 pp., 4 figs. Scope of high-frequency heating is expanding as rapidly as electrical machinery constructors can meet the requirements imposed upon them, and progress both in melting and heating of steel is being rapidly accomplished; its value is, however, already well established as a method of making crucible steel of remarkable homogeneity at a low cost, with elimination of the hard physical labor inseparable from present methods.

ELECTRIC LOCOMOTIVES

Great Northern Railway. Electric Locomotives for the American Great Northern Railway. Engineer, vol. 144, no. 3742, Sept. 30, 1927, pp. 366–367, 4 figs. Equipped with a 1500-kw. motor-generator set, three motor blowers, a compressor and four traction motors.

Motor-Generator. Great Northern Electric Locomotives, R. Walsh. Ry. Age, vol. 83, no. 13, Sept. 24, 1927, pp. 569–572, 5 figs. Describes articulated, motor-generator type electric locomotives built by Gen. Elec. Co. for Great Northern Ry.; provide variable speed, regenerative braking, and smooth acceleration for heavy grade line.

Motor-Generator Type Locomotives for Great Northern Railway, R. Walsh. Gen. Elec. Rev., vol. 30, no. 10, Oct. 1927, pp. 477–482, 6 figs. Single-phase a.c.—d.c. locomotives to handle present freight and passenger traffic; mechanical features of construction; electrical converting and driving equipment; control system and auxiliaries.

Paris-Orleans Railway. The 4000 H.P. Direct-Current Locomotives on the Paris-Orleans Railway, F. Gubler. Brown Boveri Rev., vol. 14, nos. 8 and 9, Aug. and Sept. 1927, pp. 197–203 and 234–245, 40 figs. Description of locomotives noteworthy for exceptionally high output and also for certain constructional details and way in which difficult conditions have been accurately fulfilled. Aug.: Mechanical part. Sept.: Electrical part.

Transformers. Air-blast Transformers for Great Northern Locomotives, G. L. Mower. Gen. Elec. Rev., vol. 30, no. 10, Oct. 1927, pp. 483–484, 3 figs. Mechanical and electrical service requirements; unusual features of construction incorporated; compactness, strength and capacity combined; provision for varied operating conditions.

ELECTRIC WELDING

Spot. Spot Welding of Dissimilar Metals, R. T. Gillette. Welding Engr., vol. 12, no. 9, Sept. 1927, pp. 45–47, 6 figs. Uses of spot-welding process; comparison with other methods; electrode material for dissimilar metals; electrode shape for unlike thicknesses.

ELECTRIC WELDING, ARC

"Alternarc" Process. The "Alternarc" Cutting and Welding Process. Welding Jl., vol. 24, no. 288, Sept. 1927, pp. 270–273, 4 figs. Description of "Alternarc" machine (Holslag's transformer), "Newarc" electrodes and "Alternarc" safety device.

Building Construction. An Arc Welded Residence, J. G. Dudley. Welding Engr., vol. 12, no. 9, Sept. 1927, pp. 51–53, 8 figs. Steel-framed building with all joints welded, which offers many advantages over other types of building construction.

Arc-Welded Wind Bracing Connections, W. A Hakin and R. G. Richards. Welding Engr., vol. 12, no. 9, Sept. 1927, pp. 40–44, 6 figs. Tests to determine capacity of a given connection under high bending moments, and to evolve requisite data for proper design.

Arc-Welding in Buildings, J. Matte, Jr. Am. Welding Soc.—Jl., vol. 6, no. 9, Sept. 1927, pp. 46–66, 25 figs. Paper describes a structural engineer's experiences in this field of welding and makes some suggestions which may be of assistance.

Electrical Apparatus. Welded Parts Take the Place of Castings. Machy. (Lond.), vol. 30, no. 778, Sept. 8, 1927, pp. 713–716, 9 figs. Revolutionary changes made by General Electric Co. in construction of large electrical apparatus and of smaller machines, especially when only one or few are required; whereas castings were previously used to large extent for building equipment of these classifications, they have now been almost entirely displaced by members made up by arc-welding steel plates, slabs and structural shapes together.

ELECTROPLATING

Chromium. A Detailed Study of Chromium Plating, H. E. Haring and W. P. Barrows. Brass World, vol. 23, no. 9, Sept. 1927, pp. 299–305. Three types of chromic-acid bath shown to give same results; additional light on process results from study at Bureau of Standards. Abstracted from U. S. Bur. Standards, Tech. Paper No. 346.

Progress in Chrome Plating in Germany, W. Pfanhauser. Brass World, vol. 23, no. 9, Sept. 1927, pp. 293–296. Describes apparatus which enables complete removal of hydrogen generated during chrome-plating process from chrome deposit.

ELEVATORS

Doors, Electric Control of. Elevator Doors Operated Electrically. Power, vol. 66, no. 11, Sept. 13, 1927, pp. 392–393, 4 figs. Describes type of doors opened by power obtained from electric motor and closed by springs compressed during opening operation.

Speed Control. Multi-Speed Elevators (L'emploi de plusieurs vitesses dans les ascenseurs et monte-charges), E. Bouchinot. Génie Civil, vol. 91, no. 10, Sept. 3, 1927, pp. 221–225, 11 figs. General description of speed control of elevators and detailed description of Baudet, Donon and Roussel system using a.c. motors and combining with aid of auxiliary motors, advantages of changing potential and varying field.

EVAPORATORS

Cracking of Brass Tubes in. Cracking of the Brass Tubes of Evaporators, Heaters and Evaporators, J. A. Maronier. Int. Sugar Jl., vol. 29, no. 344, Aug. 1927, pp. 418–420. Translation (abridged) from an article published in the Archief, 1926, 34, no. 38, 1051–1082.

F

FABRICS

Automobile. Manufacturing and Testing Rubber Coated Automobile Fabrics, M. N. Nickowitz. Soc. Automotive Engrs.—Jl., vol. 21, no. 4, Oct. 1927, pp. 396–400 and (discussion) 401, 3 figs. Tests applied to materials used and to finished product to assure superior quality and serviceability of material for uses to which it is to be put.

FILES

Steel, Manufacture of. Manufacturing Files of Sheffield Steel, J. W. Walker. Can. Machy., vol. 38, no. 19, Oct. 6, 1927, pp. 19–24. Outlines steels employed in manufacture of files, processes through which they pass in forming, tempering and testing and relative merits of various methods utilized.

FLOW OF AIR

Behind Inclined Flat Plate. On the Flow of Air Behind an Inclined Flat Plate of Infinite Span, A. Fage, F. C. Johansen. Roy. Soc.—Proc., vol. 116, no. A773, Sept. 1, 1927, pp. 170–197, 7 figs. Investigation undertaken to determine experimentally, at incidences below 90 per cent, frequency and speed with which vortices pass downstream; dimensions of vortex system; average strength of individual vortices; and rate at which vorticity is leaving edges of plate. Plates 6–8.

FLOW OF GASES

Resistance of Grained Materials to. The Resistance of Materials to Gas Flow, L. K. Ramsin. Fuel, vol. 6, no. 9, Sept. 1927, pp. 411–415, 4 figs. Tests conducted to secure reliable data for designing drying plants and also to determine resistance of various fuel and slag beds in furnaces.

FLOW OF WATER

Pipes. Experiments on the Loss of Head in Pressure Conduits of Small Diameter (Recherches expérimentales sur les pertes d e charges dans es conduites forcées), C. Hanco. Revue Universelle des Mines, vol. 15, no. 5, Sept. 1, 1927, pp. 202–219, 16 figs. Report on series of experiments, at the machine laboratory of the University of Liége, on steel and cast-iron pipes of 20 mm. to 50 mm. diameter, analyzed largely on basis of the Reynolds formula; theoretical discussion of most economic velocity.

FLUE GASES

Heat Losses. Charts for Finding Heat Losses in Flue Gas, M. Buskaveta. Power, vol. 66, no. 18, Nov. 1, 1927, p. 675, 2 figs. Charts for finding the heat loss in flue gas and for finding heat loss due to hydrogen in fuel.

FLYING BOATS

Twin-Engined. Supermarine Aviation Works Completes Twin Engined Boat. Aviation, vol. 23, no. 18, Oct. 31, 1927, p. 1062, 1 fig. All-metal flying boat to be used on cruise from England to Egypt, India and Singapore, and then on to Australia.

FOREMEN

Cost Reduction Through. How the Foremen Can Reduce Costs, E. H. Fish. Mfg. Industries, vol. 14, no. 4, Oct. 1927, pp. 287–290, 1 fig. Practical suggestions as to how foremen can reduce waste of materials, improve quality of product, assist engineering department on elements of design to make manufacturing easier and cheaper, and cut down overhead and indirect expenses; numerous examples and cases.

FOUNDRIES

Automobile Plants. Exceptional Conveyor

Equipment, F. L. Prentiss. Iron Age, vol. 120, no. 18, Nov. 3, 1927, pp. 1217–1223, 10 figs. New continuous gray-iron foundry of Buick Motor Co., Flint, Mich., is arranged for efficiency in operation, large production and elimination as much as possible of hard manual labor, and with more extensive use of conveying equipment than heretofore in a foundry.

Machine Molding. A Machine-Molding Foundry (Und Fonderie de Moulage Mécanique), R. de Vaucorbeil. Fonderie Moderne, vol. 21, Sept. 10, 1927, pp. 289–294, 6 figs. Layout, equipment and methods of the Guilliet Fils & Co. foundry at Auxerre, France, doing exclusively machine molding, mostly of small parts.

Production Control. Controlling Production in a Foundry, B. Finney. Iron Age, vol. 120, no. 13, Sept. 29, 1927, pp. 857–860, 4 figs. Simple system employed by Aluminum Industries, Inc., Cincinnati, to synchronize purchases of raw materials with output.

Sand Control. Bottle Test for Sand Control. Iron Age, vol. 120, no. 12, Sept. 22, 1927, pp. 793–794. Crane Co., Chicago, keeps foundry losses down by close watch of sand; has only three kinds, standard, coarse, and one with high bond; bottle and vibrator test recommended.

Ventilation. Ventilation and Dust Prevention in Foundries and Allied Plants (Entlüftung und Entstaubung von Giessereien und deren Ergänzungsbetrieben), H. Reininger. Stahl u. Eisen, vol. 47, no. 34, Aug. 25, 1927, pp. 1395–1399, 12 figs. Building design favoring efficient ventilation; details of mechanical suction apparatus, exhaustors, etc.

FOUNDRY EQUIPMENT

Flask Grinding. New Machine for Surface Grinding of Flasks (Nouvelle machine pour dresser par meulage les chassis de fonderie). Fonderie Moderne, vol. 21, Sept. 10, 1927, pp. 301–303, 3 figs. Construction and operation, advantages of grinding machine over planing and milling lathes generally used in foundries.

FREIGHT HANDLING

Freightainers. "Freightainers" on B. & M. Furnish Door-to-Door Service. Ry. Age, vol. 83, no. 13, Sept. 24, 1927, pp. 617–619, 5 figs. Describes "freightainers," steel and wood containers for transferring l.c.l. freight without rehandling from door of shipper to door of consignee; movement of freight in these containers on Boston & Maine between Boston, Worcester and Springfield now averaging about 125 tons daily.

FURNACES, GAS

Annealing. Gas-Fired Annealing Furnaces (Die Gasbeheizung der Temperöfen), A. Zankl. Giesserei Zeitung, vol. 24, no. 18, Sept. 15, 1927, pp. 521–524, 1 fig. Description and discussion of types of annealing furnaces and producers, particularly producers with fixed grates; chemistry of gas producing; operation of gas-fired annealing furnaces, advantages of gas heating.

FURNACES, HEAT-TREATING

Continuous. Conveyor Belt Acts as Furnace Floor. Iron Age, vol. 120, no. 17, Oct. 27, 1927, pp. 1158–1159, 4 figs. Continuous heat-treating furnace designed for heating and tempering cap screws, both large and small, developed by Victor-Peninsular Co., Detroit, being used by that company in production of cold upset cap screws. See also Iron Trade Rev., vol. 81, no. 10, Sept. 8, 1927, pp. 588–591, 6 figs.

Non-Continuous. Furnaces for Forging and Heat Treating, M. H. Mawhinney. Forging—Stamping—Heat Treating, vol. 13, no. 9, Sept. 1927, pp. 374–376. More important factors to be considered in selection of suitable non-continuous furnace for forging or heat treating miscellaneous pieces that are variable in size; among the features covered are design and construction, burners, fuel saving, insulation and automatic control of fuel.

Oil-Fired. Front Axles for Automobiles Uniformly Heated in Oil Fired Furnace. Fuels & Furnaces, vol. 5, no. 9, June 1927, pp. 1215–1216, 2 figs. Furnace of the walking-beam type uniformly heats axles for stretching and flattening operations.

Refractory Linings. Refractory Linings for Forge and Heating Furnaces, M. C. Booze. Fuels & Furnaces, vol. 5, no. 9, Sept. 1927, pp. 1197–1198. Different types of refractories best adapted for certain kinds of service; all desirable properties not available in any one material and it is often desirable to use two or more refractories in combination to secure maximum service; open joints and flame impingement should be avoided; cracks should be repaired immediately.

FURNACES, HEATING

Electric vs. Fuel-Fired. Comparing the Economies of Furnaces, C. L. Ipsen and A. N. Otis. Can. Machy. & Mfg. News, vol. 38, no. 16, Sept. 15, 1927, pp. 13–16, 10 figs. Compares relative economies of electric and fuel-fired furnaces for various manufacturing purposes, and outlines means whereby economies might be secured in several types.

FURNACES, INDUSTRIAL

Efficiency. Industrial Furnaces, V. J. Azbe. Mech. Eng., vol. 49, no. 10, Oct. 1927, pp. 1079–1081, 6 figs. Importance of relative temperatures of heat-radiating and heat-absorbing media; effects on efficiency of low CO_2 and excess air; cost of steam for blowing.

G

GARAGES

Design. Pointers on Garage Design from a Manufacturer. Ry. Age, vol. 83, no. 13, Sept. 24, 1927, pp. 609–614, 9 figs. New service station of International Motors Company at White Plains, N. Y., represents latest type of repair-shop construction.

Motor-Bus. How the L. G. O. Equips Its Garages, H. W. Blake. Bus. Transportation, vol. 6, no. 10, Oct. 1927, pp. 576–577, 4 figs. Describes equipment of typical garage of London General Omnibus Co.; fuel and oil supply, break-down lorry, fire-extinguishers, washing facilities, etc.

GAS PRODUCERS

Sauvageot Grate for. Gas Producer Firing. Gas & Oil Power, vol. 22, no. 263, Aug. 4, 1927, p. 229, 2 figs. Describes Sauvageot grate, found particularly adaptable to use with gas producers; consists essentially of grate of peculiar construction, an air box and mechanical drive.

GEAR CUTTING

Double-Helical Gear Generator. 10-ft. Sunderland Double-helical Gear Generator. Machy. (Lond.), vol. 30, no. 777, Sept. 1, 1927, pp. 689–691, 2 figs. Designed for cutting double-helical gears with continuous or staggered teeth up to 10 ft. diameter, 24-in. face, 1 diametral pitch or 3-inch circular pitch; but attachments may be supplied for cutting spur gears up to same dimensions, and at slow-rate pitches up to 4-inch circular pitch; also spiral gears up to limited range of face and angle.

GEARS

Backlash. Backlash and Other Gearing Problems, W. H. Himes. Machy. (N. Y.), vol. 34, no. 3, Nov. 1927, pp. 215–216. Points out that ample backlash is better than not enough; difficulties in gearing installations; how to obtain best conditions in mounting; materials for pairs of gears; helical gears for motor drives.

Hardened and Ground. Boston Hardened and Ground Gears. Am. Mach., vol. 67, no. 16, Oct. 20, 1927, p. 635. Line of standardized spur pinions with hardened and ground teeth announced by Boston Gear Works Sales Co.; gears are ground on generating-type machine to insure accuracy and correct tooth form; all warpage, due to hardening, is eliminated by grinding process.

The Hardening of Motor-Car Transmission Gears. Engineering, vol. 124, no. 3222, Oct. 14, 1927, p. 498. Abstract of report from the Cadillac Motor Car Co., Detroit, relating to critical and comparative tests on transmission-gear wheels, carried out by metallurgical research department of that company; properties of a series of six gears, hardened by British firm using Wild-Barfield electromagnetic furnace, are compared with those of series of six similar gear wheels, treated in two of best American electric furnaces, by Cadillac Company's employees.

High-Speed. Tooth Pressures for High-Speed Gears, A. A. Ross. Machy. (N. Y.), vol. 34, no. 2, Oct. 1927, pp. 110–112. Effect of velocity and pitch on the allowable pressures, and application of formulas; load per inch of face; reduction in allowable pressures for larger teeth; why arc of action is not introduced; article based upon paper read before American Gears Manufacturers' Assn.

Teeth, Strength of. Line Chart for Strength of Gear Teeth, J. Campbell. Machy. (Lond.), vol. 30, no. 777, Sept. 1, 1927, pp. 698–699. Alignment chart based on Lewis formulas for strength of gear teeth.

Tooth Machining and Measurement. Machining and Measuring Gear Teeth, E. Buckingham. Am. Mach., vol. 67, nos. 11 and 13, Sept. 15 and 29, 1927, pp. 419–422, 4 figs. and 497–498, 2 figs. Sept. 15: Cutting action of hobs and nature of hobbed surface; limitations of hobbing; shaping of gear teeth; height of fillet developed and other limitations. Sept. 29: Relieving pinion-shaped cutters; modification of pitch by change in cone angle of cutter; nature of shaped tooth surface and limitation of this method.

Variable-Speed. A Friction-Drive Variable Speed Gear. Engineering, vol. 124, no. 3220, Sept. 30, 1927, pp. 423–424, 4 figs. Variable-speed gears exhibited by Keenok Co., Ltd., at Shipping, Engineering and Machinery Exhibition at Olympia; basis of apparatus which has wide range of applicability is Keenok pinion, which is described in detail.

Worm. Novel Method Produces Perfect Fit Between Worm and Gear, K. W. Stillman. Automotive Industries, vol. 57, no. 16, Oct. 15, 1927, p. 583. Final finishing of Jordan gears is done with burnishing tool which is exact reproduction of standard worm; finish obtained is same as after 2000 miles on road.

GLUES

Adhesive Strength of. Measurement of the Adhesive Strength of Glue, C. E. Lanyon. Indus. & Eng. Chem., vol. 19, no. 10, Oct. 1927, pp. 1191–1193. Test for measuring adhesive strength of glue and results obtained.

Woodworking. The Kind of Glue That Woodworkers Buy, W. L. Jones. Wood-Worker, vol. 46, no. 7, Sept. 1927, pp. 54–55. Describes results obtained from tests of large number of samples of animal glue, which were submitted by representative groups of wood-working concerns.

GRINDING MACHINES

Automobile Parts. A New Hydraulic Plain Grinder. Automobile Engr., vol. 17, no. 232, Sept. 1927, pp. 334–335, 2 figs. Machine is made in two models with capacities of 10 in. by 20 in., and 10 in. by 36 in., respectively, the larger type being that employed for crankshaft grinding; a high-power machine for traverse or in-feed work.

Disk. 12-in. Disc Grinder. Mech. World, vol. 82, no. 2126, Sept. 30, 1927, p. 254, 1 fig. Description of machine recently built in engineering shops of Keighley Technical College.

H

HAMMERS

Steam. Driving Piles with a Steam Hammer, D. J. Emrey. Can. Engr., vol. 53, no. 10, Sept. 6, 1927, pp. 280–281, 4 figs. Method employed in place of piledriver; iron collar with wire rope guys attached hold pile while being driven with McKiernan-Terry hammer; average depth of pile was 48 feet.

Lubrication of Steam Hammers, D. C. Price. Forging—Stamping—Heat Treating, vol. 13, no. 9, Sept. 1927, pp. 360–361, 2 figs. Difficulties encountered in lubrication of steam hammers and means for overcoming them; oil should be filtered and heated.

HEAT TREATMENT

Automobile Springs. Heat Treatment of Automobile Springs in Electric Furnace. Fuels & Furnaces, vol. 5, no. 9, June 1927, pp. 1213–1214, 2 figs. Electrically heated furnace of the pusher type through which the springs are carried on short tubes pushed along in four parallel channels, has heating elements above and below the hearth.

Oxyacetylene Flame. Heat Treatment with the Oxy-Acetylene Flame, E. E. Thum. Am. Welding Soc.—Jl., vol. 6, no. 9, Sept. 1927, pp. 95–101, 7 figs. Advantages and possibilities of oxyacetylene flame for heat treatment.

HEATING AND VENTILATION

Kearny Works, Western Electric Co. Heating and Ventilating for 30,000 People, H. T. Hall. Domestic Eng., (Chicago), vol. 121, nos. 1 and 3, Oct. 1 and 15, 1927, pp. 26–29 and 31–34, 8 figs. Describes new plant of Western Electric Co. at Kearny, N. J., and equipment for heating, ventilating, etc.

Schools. Heating and Ventilating a Large High School. Power Plant Eng., vol. 31, no. 19, Oct. 1, 1927, pp. 1050–1052, 4 figs. Unit heaters and ventilating equipment, under complete thermostatic control in conjunction with steam radiators supplied from modern boiler plant, maintain proper temperatures and fresh air in new Cleveland Heights high school.

HEATING, ELECTRIC

Low-Temperature. Low Temperature Electric Heating, M. P. Whelen. Can. Machy. & Mfg. News, vol. 38, no. 18, Sept. 29, 1927, pp. 13–16, 11 figs. Growth in use of electric heating devices in home and factory in past ten years has been so phenomenal that few executives and engineers appreciate as yet opportunities now available for improving manufacturing methods and working conditions.

HEATING, GAS

Central. Gas-Fired Central Heating Systems (Die Gasfeuerung in der Zentralheizungsindustrie), H. Balcke. Gesundheits-Ingenieur, vol. 50, no. 37, Sept. 10, 1927, pp. 669–677, 12 figs. Heat installations for mineral bath resorts; construction and use of Balcke gas burners, Koerting gas-fired low-pressure steam and hot-water boilers; costs of gas firing and coal firing compared; itemized costs of gas production and long-distance gas transportation in Germany, statistics of gas consumption in Europe and Australia in 1925.

HEATING, HOT-WATER

Duplex. Interesting Example of Duplex Hot Water Heating, T. F. Moffett. Plumbers Trade Jl., vol. 83, no. 7, Oct. 1, 1927, pp. 671–673, 6 figs. Full layout for actual installation shows essential technical features.

HEATING, STEAM

Central. Heating Plants Have Difficult Water Problems. Power Plant Eng., vol. 31, no. 20, Oct. 15, 1927, pp. 1079–1081, 2 figs. Laboratory conclusions and operating results of feedwater-treating system of Beacon St. Central Heating Plant; zeolite was final selection; acid treatment follows zeolite tanks; no scale found after several months' operation.

Intermittent. A Study of Steam Control in an Intermittently-Heated Office Building, W. J. Baldwin. Heat. & Vent. Mag., vol. 24, no. 9, Sept. 1927, pp. 81–82. Analysis of steam demand of typical office building recently was made as result of data collected during thirty-two different days of last heating season; steam, supplied from mains of New York Steam Corp., was fed to building by device known as Pendleton control.

Schools. Ripping Out Furnaces and Installing a Steam Heating System in a Sixteen-Room School Building, T. N. Thomson. Plumbers Trade Jl., vol. 83, no. 7, Oct. 1, 1927, pp. 674–677, 8 figs. New steam-heating and ventilating system was laid out and installed in Potter Street School Building, Utica, N. Y.; utilizing old furnace heat flues for ventilation; installing radiators in classrooms.

Variable-Pressure. Sectional Control of Variable Steam Pressure, H. L. Alt. Heat. & Vent. Mag., vol. 24, no. 9, Sept. 1927, pp. 65–69, 8 figs. Consideration of various methods of dividing building to secure highest operating efficiency; discussion is limited to vacuum steam systems operating in large buildings, with steam pressures in radiators controlled by boiler room or at least from basement; so that pressure in radiators can be varied at will from 2 lb. gage to 22 in. or 25 in. of vacuum, thereby controlling heat emitted from radiators from normal down to about 50 per cent of normal.

HYDRAULIC PRESSES

Tire Removal. Hydraulic Presses for Fixing and Removing Wheel Tyres. Mech. World, vol. 82, no. 2126, Sept. 30, 1927, pp. 235–236, 3 figs. Equipment manufactured by Hollings & Guest, Ltd., for fixing and removing solid tires.

HYDRAULIC TURBINES

Draft Tubes. A New Profile for Draft Tubes of Turbines and Pumps (Ueber ein neues Profil für Saugrohre von Turbinen und Pumpen), K. Grimm. Schweizerische Bauzeitung, vol. 90, no. 12, Sept. 17, 1927, pp. 149–151, 2 figs. Theoretical analysis based on laws of hydrodynamics, resulting in equations for determining profile; numerical example.

Testing. Hydro Turbine Tests—Pitot and Venturi Tubes. Power Plant Eng., vol. 31, no. 20, Oct. 15, 1927, pp. 1086–1088, 6 figs. Multiple-pitot-tube method offers many advantages over single tube while venturi is only test method giving continuous record of flow; camera used to get instantaneous readings.

HYDRODYNAMICS

Progress. Recent Progress in Hydro-Dynamics, G. Darrieus. Engineering, vol. 124, nos. 3215, 3216, 3219, 3220 and 3222, Aug. 26, Sept. 2, 23, 30 and Oct. 14, 1927, pp. 277–279, 294–295, 405–406, 440–441 and 500–501, 27 figs. Translation (slightly abridged) of paper read before Société des Ingénieurs Civils de France.

HYDROELECTRIC DEVELOPMENTS

Bryson, Quebec. The Bryson Hydro-Electric Power Development, H. E. Pawson. Eng. Jl., vol. 10, no. 10, Oct. 1927, pp. 459–467, 7 figs. Features of hydroelectric power development constructed on Calumet Channel of Ottawa River near Bryson, Que., by Ottawa River Power Co.

California. Power and Irrigation Combined in Melones Development, E. A. Crellin. Elec. World, vol. 90, no. 13, Sept. 24, 1927, pp. 605–607, 6 figs. Pacific Gas & Electric Company builds power plant and pays irrigation districts' water rental; low load factor and block-load operation dictated simplicity and economy.

Connecticut. More Power for Connecticut. Constr. Methods, vol. 9, no. 10, Oct. 1927, pp. 22–25, 8 figs. Brief description of Rocky river development in northwestern Connecticut which will utilize flood waters of Housatonic river.

Deerfield River. Adequate Equipment Speeds 10,000 H.P. Hydro Electric Development on Deerfield River, L. Gurney. Contractors Rec. & Eng. Rev., vol. 15, no. 2, Aug. 1927, pp. 71–74, 6 figs. Shovels, pumps, cement mixers, derricks, trucks, hydraulic and electrical equipment used in Sherman hydroelectric development.

New Brunswick. The Grand Falls Hydraulic Power Scheme. Engineer, vol. 144, no. 3745, Oct. 21, 1927, p. 454, 4 figs. on p. 456. Details of development at Grand Falls, on Saint John River, in Province of New Brunswick.

Quebec. Hydro Development at Hemmings Falls. Can. Engr., vol. 53, no. 11, Sept. 13, 1927, pp. 289–294, 7 figs. Southern Canada Power Co.'s development on the St. Francis River near Drummondville, Que.; six 5000-hp. turbines installed driving two 30-cycle and four 60-cycle generators; details of concrete construction and equipment.

Upper Rhine. Project of Hydroelectric Development of Upper Rhine on the French Side (L'importance et l'utilisation de l'énergie du Rhin; les usines hydroélectriques de Kembs et du Grand Canal d'Alsace), F. Piot. Revue Générale de l'Électricité, vol. 22, no. 10, Sept. 10, 1927, pp. 381–393, 9 figs. International law aspects, history of projects for utilization of Rhine between Basel and Strassbourg, since 1902; development program for period 1927–1940 involving power plant at Kembs, Grand Canal of Alsace, total power development of 387,000 kw. for electrification of railroads and metallurgical plants.

HYDROELECTRIC PLANTS

Bavaria. The Walchensee Hydro-Electric Power Scheme. Engineering, vol. 124, nos. 3212, 3214, 3215, 3220 and 3221, Aug. 5, 19, 26, Sept. 30 and Oct. 7, 1927, pp. 162–164, 228–230, 255–256, 417–419 and 446–450, 29 figs. partly on supp. plates. Geographic and hydraulic conditions of Walchensee system; details of dams, intake tunnel, spillway, pipe lines, power house and equipments, etc.; types of turbines employed; details of 16,000-kw. single-phase generator.

Conowingo, Md. Conowingo, G. R. Strandberg. Elec. Light & Power, vol. 5, no. 10, Oct. 1927, pp. 26–30, Light & Power, vol. 5, no. 10, Oct. 1927, pp. 26–30, 9 figs. Distinctive features of construction of Conowingo hydroelectric plant on Susquehanna River; power will be transmitted to Philadelphia and distributed by Philadelphia Elec. Co.

Eguzon, France. Large Hydro-Electric Plant at Eguzon, France, L. B. Desbleds. Eng. News-Rec., vol. 99, no. 12, Sept. 22, 1927, pp. 458–461, 6 figs. Power to be used for electrification of Paris-Orléans Ry. and public utilities; three companies join in undertaking; dam of concrete and stone masonry 200 ft. high.

Penstocks, Fastening. Concrete Anchors Holds Penstocks to Mountain Side. Contractors & Engrs. Monthly, vol. 15, no. 3, Sept. 1927, pp. 77–79. Unusual construction problems arise in building penstock to operate under highest head in America; shows method of anchoring power house and switching rack.

Revamping. Revamping a Water-Turbine Installation in the Interests of Economy (Der Umbau von Wasserturbinen zur Erzielung grösserer Wirtschaftlichkeit), O. Albrecht and R. Haas. V.D.I. Zeit., vol. 71, no. 38, Sept. 17, 1927, pp. 1333–1335, 8 figs. Obsolete turbines of Rheinfelden power plant supplanted by modern ones, with only slight changes in size and form of turbine pits; figures of costs and economy effected.

Tailrace Sluice. Steel Sluice as Emergency Bulkhead in Tailrace of Hydroelectric Plant (Ein eisernes Schütz als Notverschluss für die Turbinenkanäle beim Kraftwerk Dörverden a.d. Weser). Zentralblatt der Bauverwaltung, vol. 47, no. 39, Sept. 28, 1927, pp. 497–498, 6 figs. Design and construction of sluice, 9.25 m. × 4.25 m.; cross-section arched downstream, to supersede regulation by needle weir; time for overhauling turbine reduced thereby from four days to one day.

I

ICE PLANTS

Aerating Equipment. Moisture in Aerating Systems, W. H. Motz. Refrigeration, vol. 42, no. 3, Sept. 1927, pp. 46–47. Effects of temperatures and pressures upon deposit of moisture by air in passing through air piping of aerating equipment of raw-water ice plants.

Auxiliary Compressors. The Auxiliary Compressor, T. Mitchell. South. Power Jl., vol. 45, no. 9, Sept. 1927, pp. 44–46, 4 figs. Modern reliability and efficiency demand auxiliary equipment in the ice plant; reliability, that continuous service be rendered through the safeguard of a standby unit, and efficiency that flexibility and high load factor for individual machines be made possible.

Diesel Engines in. Diesel Oil Engine Replaces Electric Drive. Power Plant Eng., vol. 31, no. 20, Oct. 15, 1927, pp. 1104–1105, 4 figs. Wiskow Ice Mfg. Co. of Baltimore substitutes oil-engine power for public-service power in ice plant; port scavenging under pressure removes burnt gases; precombustion chamber forms rich explosive mixture.

Florida. The New Orlando Ice Plant of the Florida Public Service Co., G. C. Hyde and G. Braungard, Jr. South. Power Jl., vol. 45, no. 9, Sept. 1927, pp. 36–39, 4 figs. Describes 50-ton ice unit to take care of additional requirements of Orlando section and for car-icing purposes; freezing system.

Management. Fundamentals in the Management of An Ice Plant, E. W. Davies. South. Power Jl., vol. 45, no. 9, Sept. 1927, pp. 52–53, 2 figs. Eternal vigilance and attention to detail essential, proper instruments for measuring economy and operation pay high dividends, and labor-saving devices adapted to the size and character of the plant add to the net return.

ICE MANUFACTURE

Quality vs. System. Cracked Ice or Clear Ice—Which Have You? H. A. Cranford. South. Power Jl., vol. 45, no. 9, Sept. 1927, pp. 62–64, 8 figs. Cracked ice the result of rapid and considerable temperature changes; its prevention depends upon better control of this factor, as dictated by the system used.

IMPACT TESTING

Repeated Impact. A Testing Machine for Repeated Impact, and a Preliminary Investigation on the Effects of Repeated Impact on Lowmoor Iron, J. H. Smith and F. V. Warnock. Iron & Steel Inst.—Advance Paper, no. 13, Sept. 1927, 33 pp., 10 figs. Investigation of effect of tensile or compressive impact when applied repeatedly in such a manner that energy given to specimen is known; description of impact-testing machine used; Lowmoor iron used for experiments, contains 99.617 per cent iron and small percentages of silicon, phosphorus, sulphur, manganese and carbon.

INDUSTRIAL MANAGEMENT

Budgetary Control. Cost Reduction Through Budget Control, K. MacGrath. Mfg. Industries, vol. 14, no. 4, Oct. 1927, pp. 283–285, 4 figs. Large savings have resulted from a shop-department budget installed by Monroe Calculating Machine Co.; foremen cooperate to cut costs.

Budgeting. Budgeting Plant and Equipment Expenditures, J. J. Berliner. Gas Age-Rec., vol. 60, no. 12, Sept. 17, 1927, pp. 400–403, 2 figs. Classification of plant and equipment expenditures; controlling disbursements; periodical inventory; appropriations.

Cost Accounting. See COST ACCOUNTING

Europe. A Professional Summer in Europe, L. M. Gilbreth. Taylor Soc.—Bul., vol. 12, no. 4, Aug. 1927, pp. 465–470. Observations on meetings of associations concerned with scientific management and human relations in industry.

General Motors Plan. Management the Major Factor in All Industry, J. J. Raskob. Indus. Mgmt. (N. Y.), vol. 74, no. 3, Sept. 1927, pp. 129–135. How management enables General Motors Corporation to decentralize operations and responsibilities under coordinated control.

Integrated Production. Integrated Production, E. P. Blanchard. Soc. Automotive Engrs.—Jl., vol. 21, no. 4, Oct. 1927, pp. 375–376. Discusses principle which consists of combining of work units, which are smallest possible divisions into which operations are broken down by time-study man, so that number of identical or similar operations are performed simultaneously by multiple tools, with maximum efficiency and economy for each tool or each work unit.

Inventory Control. Cutting Your Inventory Losses, J. J. Swan. Mfg. Industries, vol. 13, nos. 5 and 6, and vol. 14, nos. 1, 2 and 3, May, June, July, Aug. and Sept. 1927, pp. 337–340, 433–436, 33–36, 103–106 and 203–206, 8 figs. Inventory must be considered as big part of manufacturing equipment, and not as incidental matter; definite organization or department must be established, or in smaller plants some individual assigned definite duty of continually working on ways and means to reduce and keep down inventory to lowest point consistent with operation; general inventory groups. June: Factors involved in business and production that create need for inventory accounts. July: Methods of keeping standard inventory materials at lowest amounts. Aug.: Methods for determining character and amount of inventory. Sept.: How to keep down purchases.

Overcapacity. Overcapacity: Problem or Opportunity? E. N. Hurley. Factory, vol. 39, no. 3, Sept. 1927, pp. 407–411. States that manufacturers who increase investments materially in order to reduce costs are employing one of surest methods for increasing present profits and assuring future stability.

Production Control. Applied Methods of Manufacturing Control, F. A. Parkhurst. Mfg. Industries, vol. 14, no. 3, Sept. 1927, pp. 171–174. To reduce costs, increase wages and enlarge profits there must be adequate form of organization with accurate comparative cost data, standardized control of design, equipment, methods, incentive plan of wage payment, material control, etc.; management must also realize importance of having predetermined standards to work to.

Better Methods and Improved Equipment Greatly Increase Production, H. T. Gillen. Mfg. Industries, vol. 14, no. 1, July 1927, pp. 11–14, 1 fig. Development of production-control system in Goodyear plant; one-eighth inventory, 60% more output, one-third labor cost and half-labor turnover are achievements of last 7 years.

Production-Equipment Maintenance. Keeping the Production Equipment in Trim, C. S. Gotwals. Indus. Mgmt. (N. Y.), vol. 74, no. 3, Sept. 1927, pp. 174–176. Plant of Hess-Bright Mfg. Co. develops practical program for maintenance of production equipment based on objective of maximum production with minimum cost.

Purchasing. Representative Policies and Methods for Purchasing New Equipment, L. P. Alford. Mfg. Industries, vol. 14, no. 4, Oct. 1927, pp. 277–282. Author discusses following questions: How soon must new equipment pay for itself to be an economical buy? How is cost of new equipment charged to product? How is advantage taken of all new cost-reducing developments? How is the undepreciated value of junked equipment charged off? What attention is given to the selection and purchase of new equipment?

Quantity Production. Quantity Manufacturing and Testing of Industrial Control Devices, G. H. Dorgeloh. Gen. Elec. Rev., vol. 30, no. 10, Oct. 1927, pp. 485–487, 7 figs. Preliminary considerations for mass production; progressive-assembly system; steps in manufacture of compensators; testing temperature-overload relays.

Time Study. See TIME STUDY.

INDUSTRIAL RELATIONS

Employers. Industrial Leadership and The Executive, S. A. Lewisohn. Military Engr., vol. 19, no. 107, Sept.-Oct., 1927, pp. 381–383. Study of administrative aspect of labor problem; attributes of the good leader and executive.

INSULATION, HEAT

Economy. Money Saved by Heat Insulation, L. M. Arkley. Contract Rec. & Eng. Rev., vol. 41, no. 37, Sept. 14, 1927, pp. 931–933 and 943, 1 fig. Means to conserve heat and prevent its dissipation are simple and inexpensive when compared with the savings due to lower radiation required and reduced fuel cost.

Houses. Insulating Materials and Their Various Properties. Heat. & Vent. Mag., vol. 24, no. 10, Oct. 1927, pp. 88–89. A report to the American Gas Association by the sub-committee of its house heating committee.

INTERNAL-COMBUSTION ENGINES

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; OIL ENGINES.]

Bearing Pressures. When Does a Bearing Pound in an Internal Combustion Engine? L. H. Morrison. Power, vol. 66, no. 15, Oct. 11, 1927, pp. 550–551, 4 figs. Discussion of bearing pressures, intended to show that current ideas as to when bearing pounds are erroneous; while Otto-cycle gas engine is used as illustration, reasoning applies to all gas engines.

IRON ALLOYS

Aluminum, Effect of. The Influence of Aluminum on an Iron-Carbon Alloy, A. B. Everest. Foundry Trade Jl., vol. 36, no. 575, Aug. 25, 1927, pp. 169–173, 9 figs. Describes preliminary investigation at Univ. of Birmingham; results indicate range of alloys which might be investigated in further detail with a view to their commercial application.

Cementation. Cementation of Ferrous Alloys with Vanadium and with Cobalt (Cementation des alliages ferreux par le vanadium et par le cobalt), J. Laissus. Revue de Métallurgie, vol. 24, no. 8, Aug. 1927, pp. 474–484, 15 figs. Theoretical and experimental study showing that cementation with either of these metals produces a superficial layer, whose thickness can be increased by raising temperature or prolonging treatment, which resists corrosion by water and acids.

Iron-Nickel. The Influence of Nickel and Silicon on an Iron-Carbon Alloy, A. B. Everest, T. H. Turner and D. Hanson. Iron & Steel Inst.—Advance Paper, no. 4, Sept. 1927, 29 pp., 31 figs. Account of investigation to obtain information concerning fundamental action of nickel, by studying its effect on simple iron-carbon-silicon alloys, before proceeding to the investigation on more complex cast irons, in which other elements always occur.

Silicon-Carbon. The Constitution of Silicon-Carbon-Iron Alloys and a New Theory of the Cast Irons, D. Hanson. Iron & Steel Inst.—Advance Paper, no. 6, Sept. 1927, 41 pp., 16 figs. Investigation carried out by author for Cast Iron Research Association on ternary alloys of iron containing 0 to 2 per cent of silicon and 0 to 4 per cent of carbons, it is shown that in ternary alloys, graphite and cementite

can occur as stable phases, either separately or together and limits of temperature and composition within which each occurs have been determined; theory of cast iron is developed with reference to ternary equilibrium of this alloys system, and is used to account for principal features of commercial iron carbon alloys.

IRON CASTINGS

Cleaning. Cleaning of Castings (Gussputzverfahren in ihrer Entwicklung bis zur Gegenwart), K. Sipp. Giesserei, vol. 14, no. 36, Sept. 3, 1927, pp. 601–609, 27 figs. Evolution of processes for cleaning castings of sand, removing burrs, etc.; critical description and operation costs of methods used in German foundries, with particular reference to hydraulic power cleaning.

Stresses in. Cause and Effect of Stresses in Castings, F. E. Cardullo. Machy. (N. Y.), vol. 34, no. 2, Oct. 1927, pp. 121–122. Stresses set up in castings as result of difference in temperature in various parts of casting at instant that part which solidifies last assumes its permanent form; factors that cause change in form of casting; shrinkage strains; effect of clamping and shrinkage strains; allowing work to cool between cuts.

L

LATHES

Arbors. The End Clamping Details of Turning Arbors. Mech. World, vol. 82, no. 2123, Sept. 9, 1927, pp. 184–185, 9 figs. Discussion of new kinds of nuts and end-pressure devices for lathes.

Cam-Turning. Turning Camshafts. Automobile Engr., vol. 17, no. 232, Sept. 1927, p. 338, 1 fig. Machine in which cutting element is a turning tool in its simplest form; designed for rough and finish-turning contour of any number of cams simultaneously.

Precision. 4-inch Precision Lathe. Machy. (Lond.), vol. 30, no. 777, Sept. 1, 1927, pp. 691–692, 2 figs. Machine is especially intended for instrument work where high degree of accuracy is necessary; fast headstock which is back geared gives 12 spindle speeds through two-speed countershaft, speeds ranging from 43 to 1340 revolutions per minute.

Railway-Wheel. Motor-Driven Heavy Duty Railway Wheel Lathe. Machy. (Lond.), vol. 30, no. 781, Sept. 29, 1927, pp. 810–811, 3 figs. Motor-driven 20-inch center railway wheel lathe recently constructed by John Hetherington & Sons, Ltd., Manchester, is capable of turning both wheels simultaneously, mounted on their axle, up to 30 in. diameter on tread, and down to a minimum diameter of 24 in.

Single-Point Profile Turning in. Single-Point Profile Turning. Mech. World, vol. 82, no. 2126, Sept. 30, 1927, pp. 238–239, 6 figs. Describes methods of single-point generation of profiles by means of which cutting can proceed at about ordinary speeds and feeds, and result in good finish without chatter or deep scratches.

LEAD ALLOYS

Lead-Tin. Effect of Work and Annealing on the Lead-Tin Eutectic, F. Hargreaves. Engineering, vol. 124, no. 3218, Sept. 16, 1927, pp. 375–376. Experiments made to determine relationship between amount of softening action resulting from work at air temperature on specimen of lead-tin eutectic, and degree of working; effect of annealing at different temperatures for varying periods also determined.

LIGHTING

Factories. Rewires Factory for Better Lighting, J. M. Ketch and L. R. Bogardus. Elec. World, vol. 90, no. 14, Oct. 1, 1927, pp. 695–698. Packard Motor Car Co. revamps its lighting system; use of newly developed square conduit gives unusual flexibility to wiring.

LOCOMOTIVE BOILERS

Repair by Welding. Autogenous Welding Used to Repair Locomotive Boilers (Application de la soudure autogène à la réparation des chaudières-locomotives), M. E. Renaud. Revue Générale des Chemins de Fer, vol. 46, no. 9, Sept. 1927, pp. 248–262, 24 figs. Practice of Sotterville repair shops of state railways of France in welding of steel and brass by oxyacetylene and electric methods; details of procedure, results of tests, metallographic study of welds.

LOCOMOTIVES

4-6-0. New 4-6-0 Type Express Passenger Locomotives, Great Western Railway, C. S. Lake. Model Engr. & Light Machy. Rev., vol. 57, no. 1374, Sept. 8, 1927, pp. 219–222. New series of locomotives recently completed at Swindon Works of Great Western Railway larger and more powerful than any other engine of same type yet built in Great Britain.

Freight. Erie Acquires 2-8-4 Locomotives for Freight Service. Railway Age, vol. 83, no. 15, Oct. 8, 1927, pp. 669–671. Designed to haul heavier trains at greater speeds; tractive force with booster, 85,000 lb.

Mallet. New Mallet Tank Locomotive for the German Railways. Ry. Engr., vol. 49, no. 573, Oct. 1927, pp. 370–372, 6 figs. Engine which is of 0-8 8-0 wheel arrangement claimed to be largest and heaviest locomotive in Europe and represents marked development in design and construction of Mallet type.

2-8-2. New 2-8-2 Type Locomotives for Kenya & Uganda Railway. Ry. Engr., vol. 49, no. 573, Oct. 1927, pp. 367–369, 4 figs. Description of new meter-gage 2-8-2 type locomotive and double-bogie tender recently constructed for Kenya & Uganda railway; these engines are believed to be the heaviest and most powerful non-articulated type locomotives as yet constructed for the meter gage.

Valve Gears. Locomotive with Beardmore-Caprotti Valve Gear; L. M. S. Railway. Engineering, vol. 124, no. 3216, Sept. 2, 1927, p. 293. Results of comparative tests of engines fitted with Beardmore-Caprotti gears and with ordinary gear.

LUBRICANTS

Automotive. Automotive Lubricants, L. W. Parsons. Indus. & Eng. Chem., vol. 19, no. 10, Oct. 1927, pp. 1116–1119. Contribution of chemistry to development of automotive lubricants; the refining of crude oil to make satisfactory lubricants for automotive purposes; properties of lubricating oils; lubrication theory and composition of lubricants; variety of lubricants; lubrication of airplanes, motor-driven ships, and submarines; changes in properties of lubricants in service; lubrication research projects.

Gas Engines and Compressors. Fundamentals of Correct Lubrication, A. J. Turner. Oil & Gas Jl., vol. 26, no. 19, Sept. 29, 1927, p. 172. Proper oils for natural-gas engine and compressor lubrication; definite operating factors considered.

Greases, Properties of. Properties of Greases and Their Use for Lubrication, H. L. Kauffman. Eng. World, vol. 31, no. 3, Sept. 1927, pp. 162–164. Outstanding advantages of grease lubrication; kinds of greases; applying; grease cups; etc.

LUBRICATING OILS

Coals, as Source of. Lubricating Oils from Coals, H. Nielsen and S. Baker. Mech. Eng., vol. 49, no. 10, Oct. 1927, pp. 1109–1110, 5 figs. Method of preparation of lubricating oil from coal oil and report of tests of two samples, one distilled from coal and the other a straight mineral oil.

Testing. A Machine for Testing Lubricating Oils and Anti-friction Alloys (Machine à essayer les huiles de graissage, les bronzes et alliages antifrictions de la Compagnie des Chemins de Fer de l'Est). Société d'Encouragement pour L'Industrie Nationale, vol. 126, no. 6, June 1927, pp. 444–449, 6 figs. Describes machine developed by leading French railway company, recording friction coefficients, temperatures, etc., of lubricating or anti-friction materials, which are supplied by standard pad to standard journal-bearing running at prescribed velocity.

LUBRICATION

Steam Cylinders. Theory and Practice of Steam Cylinder Lubrication. Lubrication, vol. 13, no. 8, Aug. 1927, pp. 86–96, 19 figs. Consideration of operating conditions which must be met by cylinder oil; requirements of specific types of engines; types of lubricants and method of application; types of lubricators and principles involved in delivery; superheat conditions; determination of effective lubrication

M

MACHINE SHOPS

Grinding vs. Hand Scraping. Supplanting Hand Scraping With Grinding. Am. Mach., vol. 67, no. 14, Oct. 6, 1927, pp. 535–536, 3 figs. Accurate results in grinding at plant of Bullard Machine Tool Co. show that all hand scraping can be done away with where amount of scraping justifies expense.

Marine and Other Repairs. Marine and Other Repairs in a Cuban Shop, F. H. Colvin. Am. Mach., vol. 67, no. 15, Oct. 13, 1927, pp. 585–587, 7 figs. Describes condition in shop of Havana Marine Railways, Inc., at Casa Blanca, Cuba.

Problems in. Some Machine Shop Problems, H. Herring. Junior Instn. Engrs.—Jl., vol. 37, part 11, Aug. 1927, pp. 584–594, 14 figs. Deals with few problems that have presented themselves in machine shop where author is engaged, and gives solutions which have been found to be satisfactory.

MACHINE TOOLS

Automotive. Machine Tools for Automotive Use Predominate at Cleveland Show, E. B. Neil and K. W. Stillman. Automotive Industries, vol. 57, no. 14, Oct. 1, 1927, pp. 492–499. Unusually large number of new designs exhibited; new trends revealed.

Cleveland Exhibition. Most Recent Developments in the Tools of Industry to Be Assembled Under One Roof in Cleveland. Iron Age, vol. 120, no. 11, Sept. 15, 1927, pp. 701–725, 70 figs. Brief descriptions of some of machines for exhibition; list of exhibiting companies, with enumeration of products shown.

Crankpin Manufacturing. Crank-pin Turning, Grinding, Boring, and Quartering Machine. Machy. (Lond.), vol. 30, no. 780, Sept. 22, 1927, pp. 791–792, 3 figs. Describes machine designed for boring crankpin holes in locomotive wheels, either straight or tapered, and for turning and grinding crankpins at true quartered centers; constructed by John Holroyd & Co., Ltd.; feature of machine is patent automatic reversing adjustable feed which makes over-running of grinding wheel impossible.

Detroit Show. Steel and Machine Tool Exposition Displays New Products. Automotive Industries, vol. 57, no. 14, Oct. 1, 1927, pp. 514–516. Survey of ninth annual steel and machine tool exposition held at Detroit, by Am. Soc. for Steel Treating.

Exhibitions. New Abrasive Developments May Be studied at Machine Tool Show. Abrasive Industry, vol. 8, no. 10, Oct. 1927, pp. 310–319, 15 figs. Brief description of few new grinding machines shown for first time at National Machine Tool Builders' Exposition held in Cleveland, Sept. 19–23.

Keyseating Fixtures. Fixtures and Gauges for Cutting Woodruff Keyseats. Machy. (Lond.), vol. 30, no. 780, Sept. 22, 1927, pp. 783–784, 5 figs. Automobile industry requires thousands of shafts, from 6 to 12 in. long, with Woodruff keyseats near ends; article describes several types of satisfactory fixtures for gripping shafts in chuck to hold and index them when cutting keyseats.

Lubrication. Modern Lubrication Devices for Machine Tools (Neuzeitliche Schmiereinrichtungen an Werkzeugmaschinen), O. Weil. Maschinenbau, vol. 6, no. 18, Sept. 15, 1927, pp. 899–904, 25 figs. Describes apparatus for central lubrication, particularly pressure lubrication, illustrating with a number of practical examples.

Replacement Policy. Profits from New Machine Equipment, F. C. Hudson. Am. Mach., vol. 67, no. 15, Oct. 13, 1927, pp. 583–584. Outlines methods pursued by management of good-sized shop in buying machinery for building diversified line of fairly large machinery.

Unit System of Building. Machine Tools Built by Unit System, B. Finney. Iron Age, vol. 120, no. 17, Oct. 27, 1927, pp. 1151–1164, 7 figs. Parts completed in a single group of machines; careful routing of materials to minimize handling.

MACHINERY

London Exhibition. The Shipping, Engineering and Machinery Exhibition. Engineer, vol. 144, nos. 3739, 3740, 3741 and 3742, Sept. 9, 16, 23 and 30, 1927, pp. 275–279, 303–308, 331–340 and 375–378, 71 figs. Brief review of exhibits. See also special supplement of 20 pages with issue of Sept. 9.

Production 1925. Machinery Production in 1925. Am. Mach., vol. 67, no. 18, Nov. 3, 1927, p. 707. Chart based on figures published by U. S. Bur. of Census; gives money valuation of machinery manufactured in United States during year 1925. Reference-book sheet.

Toronto Show. Steel and Power Show Proves Triumph. Can. Machy. & Mfg. News, vol. 38, no. 17, Sept. 22, 1927, pp. 21–34. Review of Canada's first Steel and Power Show, held at Toronto, Aug. 21, Sept. 1 and 2; technical sessions; arrangement of exhibitions; list of equipment and products on display.

MAGNESIUM ALLOYS

Magnesium-Cadmium. The System Magnesium-Cadmium, W. Hume-Rothery and S. W. Bowell. Inst. of Metals—Advance Paper, no. 445, 1927, 18 pp., 9 figs. Equilibrium diagram of the system magnesium-cadmium investigated by thermal and microscopic methods; prolonged annealing is necessary to attain equilibrium in the solid alloys in the neighborhood of the compound $MgCd_3$.

MALLEABLE CASTINGS

Annealing. Better Boxes for Malleable Annealing, J. H. Hruska. Iron Age, vol. 120, no. 16, Oct. 20, 1927, p. 1086. Proper chemical composition essential; thermal deterioration must be considered; recommendations made.

MATERIALS HANDLING

Automobile Manufacturing Plants. Ford Sheet Steel Handling Methods Save Time and Damage. Automotive Industries, vol. 57, no. 15, Oct. 8, 1927, p. 539. Three men are able to unload 50-ton car in one hour by means of dollies, transfer trucks, and crane.

Material-Handling Methods, K. W. Stillman. Automotive Industries, vol. 57, no. 14, Oct. 1, 1927, pp. 485–491, 25 figs. 25 examples of modern practice in automotive plants.

Equipment Maintenance. Keeping Up the Equipment That Handles the Work, K. D. Hamilton. Factory, vol. 39, no. 3, Sept. 1927, pp. 421–423. Discusses such essentials as inspection, lubrication, and protection, for maintenance of materials-handling equipment in various lines of work.

Factories. Methods of Solving Material Handling Problems, D. B. Kift. Indus. Eng., vol. 85, no. 9, Sept. 1927, pp. 397–400, 5 figs. Steps taken by Edison Elec. Appliance Co., Inc., Chicago, to overcome difficulties in handling various materials in plant manufacturing electric ranges and refrigerators, and other electric household appliances.

Interdepartmental. Improved Handling of Material Increases Production, F. W. Curtis. Am. Mach., vol. 67, no. 16, Oct. 20, 1927, pp. 609–612, 8 figs. Interdepartmental transportation of materials is accomplished by fleet of trucks that are stored in convenient stalls located in each department.

Layout and Equipment. Checking Up the Efficiency of the Plant Material Handling System, G. E. Hagemann. Mfg. Industries, vol. 14, no. 4, Oct. 1927, pp. 291–294, 6 figs. Factors involving layout, methods and equipment.

Machine Shops. Material-Handling Appliances in a Modern Department. Am. Mach., vol. 67, nos. 16 and 18, Oct. 20 and Nov. 3, 1927, pp. 605–607 and 687–689, 12 figs. Oct. 20: Screw-machine department in which conveyors displace manual handling in passage of work from raw material to finished-parts stockroom. Nov. 3: How material is handled in plating room; vertical conveyors.

Miscellaneous Items. Less Direct Labor Cost by Mechanical Handling, E. Lilly. Factory, vol. 39, no. 3, Sept. 1927, pp. 529–540. Adapting conveyors to handle relatively small lots of many different items.

Warehouses. Applying Mechanical Handling Principles to a Jobber's Supply Warehouse, T. S. Rogers. Indus. Mgmt. (N. Y.), vol. 74, no. 3, Sept. 1927, pp. 157–163, 16 figs. Mechanical means of materials handling in jobbing supply house dealing in pipe and pipe fittings.

MEASUREMENTS

Length Standards. Testing of Line Standards of Length. U. S. Bur. Standards—Circular, no. 232, May 13, 1927, 22 pp., 2 figs. Outlines methods used

in comparison and standardization of line standards of length and gives basis of such measurements in United States; apparatus used and precautions necessary for precise work are considered; information regarding testing of line standards and of metal tapes is given, including shipping directions.

METALS

Grain Growth. Grain Growth in Compressed Metal Powder, C. J. Smithells, W. R. Pitkin and J. W. Avery. Inst. of Metals—Advance Paper, no. 441, 1927, 13 pp., 15 figs. Investigation of changes which take place in certain properties of bars of pressed tungsten powder when temperatures are gradually raised; these changes are attributed to grain growth, which is shown to begin at a temperature determined by the particle size of the powder and the pressure used in forming the bar.

Plastic Deformation. The Plastic Deformation and Fracture of Metals, W. Rosenhain. Engineer, vol. 144, no. 3744, Oct. 14, 1927, pp. 422–423. Summarizes position of various problems relating to plastic strain and fracture as they stand today.

Strength at High Temperatures. Experimental Researches on the Speed of Deformation of Metals at High Temperatures (Recherches expérimentales sur les vitesses de déformation des métaux aux hautes températures), P. Henry. Revue de Métallurgie, vol. 24, no. 8, Aug. 1927, pp. 421–442, 16 figs. History of such researches in Europe and America; report on experiments, at the laboratory of general chemistry of the Sorbonne of Paris, on the effect of torsional stresses on copper and steels at high temperatures, which resulted in formulas for solid copper at all temperatures and for steels and iron between 400 and 800 deg. cent.; formulas extended to apply to tensile stresses at point of creep.

MICROMETERS

Screw. The Meter-Inch Micrometer. Model Engr. & Light Machy. Rev., vol. 57, no. 1373, Sept. 1, 1927, pp. 202–203, 3 figs. Describes combination of metric and inch micrometer instrument which as a whole is considered accurate within satisfactory limits, calibration of screw for progressive error at intervals of 0.1 in. over its 1 in. of length showed it to be within 0.0001 of an inch total, and within 0.003 mm. by metric measure.

MILLING MACHINES

Adapta. The "Adapta" Milling Machine. Machy. (Lond.), vol. 30, no. 778, Sept. 8, 1927, pp. 718–720, 4 figs. Machine adaptable to large variety of operations usually done by milling cutters, and without limitations of usual types of machines.

Wanderer. Wanderer Milling Machines. Machy. (Lond.), vol. 30, no. 777, Sept. 1, 1927, pp. 696–697, 2 figs. Intermittent feeding and rapid traverse motions are most noticeable features of new range of plain, universal and vertical milling machines recently developed by Wanderer-Werke, Chemnitz, Germany.

MOLDS

Drying. Drying of Molds and the Thermal Efficiency of Drying Ovens (Die Trocknung von Gussformen und der thermische Wirkungsgrad von Trockenöfen), E. Diepschlag. Giesserei-Zeitung, vol. 24, no. 16, Aug. 15, 1927, pp. 447–450, 8 figs. Methods of operation more important than type of construction; tables and curves giving hot-air requirements of drying ovens, loss of heat through walls, temperature-humidity relation, thermal efficiency, saturation point of flue gases, etc.

Sand, Blacking. Blacking Sand Moulds, J. Dean. Foundry Trade Jl., vol. 36, no. 576, Sept. 1, 1927, p. 196. Utility of blacking mixtures; mixing blacking; sprayer for blacking.

MOTOR-BUS TRANSPORTATION

Electric-Railway Operation. Electric Railways Now Operating More Than 8350 Buses. Aera, vol. 18, no. 3, Oct. 1927, pp. 332–360. Motor-coach service being rendered by 367 companies over 16,772 miles of route; increase of 29 companies and 1796 buses since October, 1926; more buses in city service than in interurban service; detailed figures reveal interesting changes in types of equipment, indicating many renewals and replacements of vehicles.

Railways, Adoption by. Railway Bus and Truck Operation Tabulated. Ry. Age, vol. 83, no. 13, Sept. 24, 1927, pp. 603–605. Tabulations showing extent to which steam railways have adopted motor buses and trucks; fifty-two roads operate over 800 buses, while 46 use over 3300 trucks, tractors, and trailers.

Selecting Vehicles. Factors to Be Considered in Selecting Vehicles, A. M. Hill. Bus Transportation, vol. 6, no. 10, Oct. 1927, pp. 537–538. Class of type of service and the road conditions encountered, in addition to the more general requirements, are vital factors that must be considered in selecting vehicles.

MOTOR BUSES

Design. Passenger Comfort and Handling Improved in Latest Body Development. Bus Transportation, vol. 6, no. 10, Oct. 1927, pp. 561–565, 18 figs. Fageol Coach Co. adopts frameless design, which, instead of having a chassis frame and a foundation almost as heavy supporting the body, the "live" parts of the chassis are attached to the body structure, making latter sufficiently heavy and strong; other novel design features.

Steady Progress Features Construction, R. E. Plimpton. Bus Transportation, vol. 6, no. 10, Oct. 1927, pp. 558–560, 12 figs. Changes in design to increase revenue and reduce cost; chassis and components; body and fittings.

The Trend of Bus Design, D. Blanchard. Operation and Maintenance, vol. 36, no. 3, Sept. 15, 1927, pp. 11–13, 12 figs. More economical operation, higher average operating speeds, increased riding comfort and improved appearance continue to be the main objectives of bus-design development work.

What Europe's Bus Industry Is Doing, W. F. Bradley. Operation & Maintenance, vol. 36, no. 3, Sept. 15, 1927, pp. 24–26 and 44, 12 figs. Fabric leather bodies, four-wheel brakes and six-cylinder engines among major design trends.

Mercedes-Benz. A New German Omnibus Chassis. Motor Transport, vol. 45, no. 1175, Sept. 1927, pp. 343–344, 6 figs. Details of 70-hp., 6-cylinder model, exhibited at Olympia show; power and transmission unit; clutch and gear box; bodywork.

Terminals. City Terminals for Suburban Buses, W. Tufts. Bus Transportation, vol. 6, no. 9, Sept. 1927, pp. 491–493, 2 figs. Type of terminal; financing and operation.

MOTOR-TRUCK TRANSPORTATION

Southern Pacific. Auto Trucks Do Supply-Train Work on the Southern Pacific, J. M. Day. Railway Age, vol. 83, no. 15, Oct. 8, 1927, pp. 690–692. Results achieved by close study of auto trucking service at West Oakland district stores indicate that money can be saved and material deliveries speeded up on any railroad through careful study and operation of this phase of material distribution which develops low handling costs.

MOTOR TRUCKS

Henschel. A German Six-Tonner. Motor Transport, vol. 45, no. 1176, Sept. 26, 1927, pp. 369–370, 5 figs. Details of Henschel 75 hp. 6-cylinder chassis designed for loads up to 6 tons; engine can be used as brake; mechanical brakes for emergencies.

N

NICKEL STEEL

Nickel-Chromium. Magnetic and Other Changes Concerned in the Temper-Brittleness of Nickel-Chromium Steels, H. A. Dickie. Iron & Steel Inst. —Advance Paper, no. 2, Sept. 1927, 16 pp., 10 figs. Account of experiments carried out to discover how the magnetic properties, the specific electrical resistance, the specific volume, and the hardness of highly susceptible nickel-chromium steels are affected by various tempering treatments.

NON-FERROUS METALS

Tensile Test Bars. Methods for Gating Tensile Test Bars of Sand-Cast Non-Ferrous Alloys, R. J. Anderson. Foundry Trade Jl., vol. 36, no. 18, Aug. 18, 1927, pp. 159–161, 10 figs. Various tests were made by writer with gating methods on a large number of commercial casting brasses, bronzes, and aluminum alloys, excepting high-shrinkage brasses of the type of aluminum brass and manganese bronze.

O

OIL ENGINES

Airless-Injection. Airless Injection and Combustion of Fuel in the High Compression Heavy Oil Engine, D. H. Alexander. Inst. Mar. Engrs.—Trans., vol. 39, Aug. 1927, pp. 366–414, 30 figs. Investigation of working of "controlled pump" or "intermittent pressure" type of oil-fuel injection carried out at Cambridge University by author.

Automotive. What Is the Automotive Future of the Oil Engine? Oil Engine Power, vol. 5, no. 10, Oct. 1927, pp. 676–677, 1 fig. Use of oil engines for automotive service in Europe; comparison of operating cost of Diesel and gasoline trucks.

Bearings. Criticism of Oil Engine Bearings, R. Hilderbrand. Power, vol. 66, no. 16, Oct. 18, 1927, pp. 592–595, 7 figs. It is claimed that bearings should be redesigned; method of pouring babbitt is declared faulty; author eliminates bearing shell, casting babbitt direct.

Cooling-Water and Scale Formation. Treatment of Scale Formation in Oil Engine Power Plant, A. B. Newell. Nat. Engr., vol. 31, no. 9, Sept. 1927, pp. 433–435. Factors affected by water supply; effects of excessively low engine temperature; removing scale from engines; elimination of scale formation.

Fiat. Fiat Two-Stroke Cycle Double-Acting Heavy-Oil Engine. Marine Engr. & Motorship Bldr., vol. 50, no. 601, Sept. 1927, pp. 330–332, 3 figs. Details of one of largest units in existence; 2000 b.hp. developed in 33-in. cylinder; air injection and valve-controlled port scavenging.

Fuel Supply. The Future Supply of Suitable Fuels for Oil Engines, G. H. Michler. Mar. News, vol. 14, no. 5, Oct. 1927, pp. 82–84 and 144. Author discusses various phases of fuel-supply problem and states that he can see no reason to doubt that there will be in future an adequate supply of oil suitable for Diesel engines to take care of even growing demand, nor is there any justifiable reason to feel price will go above level where Diesel engines can favorably compare with steam machinery burning coal.

OPEN-HEARTH FURNACES

Regenerators for. Regenerators for Open Hearth Furnaces, F. H. Loftus. Blast Furnace & Steel Plant, vol. 15, no. 9, Sept. 1927, pp. 438–440, 2 figs. Form of checker installation described has as its objective, increased efficiency, less regenerator space, reduction in cost of upkeep, and fewer shutdowns.

OXYACETYLENE WELDING

Flames. Fusion Flames, Particularly the Acetylene Welding Flame (Zur Kenntnis der Schmelzflammen, insbesondere der Acetylenschweissflamme), Pothmann. Autogene Metallbearbeitung, vol. 20, nos. 4 and 5, Feb. 15 and Mar. 1, 1927, pp. 50–57 and 67–73, 33 figs. Experimental data on relation between speed of welding to thickness of plate and properties of metal, effect of oxygen content, presence of water vapor and other injurious gases, chemical composition of acetylene and oxyacetylene flames and their structure; heat value of acetylene and many other gas and liquid flames which may be employed in welding.

Heating Systems. Oxy-Acetylene for the Heating Trade, J.L. Musgrave and W. A. E. Taylor. Acetylene Jl., vol. 29, no. 3, Sept. 1927, pp. 109–112, 13 figs. Shows that the gas-welding process may play an important part in the construction of heating systems.

P

PIPES

Slide Rule for. A Slide Rule for Pipe-Line Computations (Rohrleitungs-Rechenschieber), H. Behrens Gesundheits-Ingenieur, vol. 50, no. 36, Sept. 3, 1927, pp. 645–648. Describes original slide rule, in 12.5- and 25-cm. sizes, for solving number of empirical formulas used in water (also hot water), steam and gas practice, including friction and water-hammer formulas; numerical examples illustrating its use.

PLANERS

Reversing Drive. Reversing Planing Machine Drive. Machy. (Lond.), vol. 30, no. 780, Sept. 22, 1927, pp. 789–790, 2 figs. Describes Niles-Bement-Pond planing machine with super control by means of which planer motor is quickly and smoothly reversed without the necessity of using an automatic controller; this form of control will work equally well on alternating and direct current.

POWER GENERATION

Economical. Harnischfeger Corp. Makes Low-Cost Power. Power Plant Eng., vol. 31, no. 20, Oct. 15, 1927, pp. 1084–1085, 6 figs. Simple, complete records and new boilers with water-cooled furnaces and air preheaters, are features of large industrial plant in Milwaukee.

POWER TRANSMISSION

Belts. New Apparatus for the Investigation of Belt Phenomena, H. W. Swift. Engineering, vol. 124, no. 3220, Sept. 30, 1927, pp. 438–440, 6 figs. Equipment and investigations at Bradford Technical College for studying fundamental principles of power transmission by belts.

Variable-Speed. Grooving Machine for Coned Wheels. Engineer, vol. 144, no. 3739, Sept. 9, 1927, p. 280, 3 figs. In the practical production of the positive, infinitely variable change-speed gear, one of the chief manufacturing problems to be overcome was to devise a satisfactory method of forming the teeth on the faces of the conical plates between which the self-pitching chain has to run.

PULVERIZED COAL

Boiler Firing. Pulverized-Coal Installation Saves \$6300 in Six Months, B. H. Roberts. Power, vol. 66, no. 15, Oct. 11, 1927, pp. 540–541, 3 figs. Unit pulverizers replacing oil firing on two return-tubular boilers make material reduction in operating expenses; on fuel item alone saving was \$6700; efficiency of boiler plant with coal firing 75 per cent.

Burning, Methods for. Considerations in Changing to Powdered Coal, L. C. Fessenden. Power Plant Eng., vol. 31, no. 20, Oct. 15, 1927, pp. 1082–1083. When being substituted for stokers or hand firing successful operation of pulverized-fuel-burning equipment depends to large extent upon consideration given to making proper installation; two methods employed in burning pulverized coal, bin or storage type and unit pulverizer.

Small Boilers. Powdered Coal for Small Boilers. Power, vol. 66, no. 17, Oct. 25, 1927, pp. 643–644. Features of design that tend to make up ideal unit-pulverizer installation for boilers having up to 5000 sq. ft. of surface and some of common mistakes that have been made during last few years.

PUMPING STATIONS

Design. Modern Waterworks Pumping Station Design and Its Future Trend, A. L. Mullergren. Contract Rec. & Eng. Rev., vol. 41, no. 36, Sept. 7, 1927, pp. 913–917. Improvements that have taken place in the equipment and operation of steam plants; tendency is toward higher pump capacities; developments in electrical installations.

PUMPS

Tangential. Use and Production of Tangential Pumps, D. M. Duncan. Can. Machy. & Mfg. News, vol. 38, no. 15, Sept. 8, 1927, pp. 11–12, 3 figs. Compares fields of reciprocating and centrifugal pumps and indicates intermediate position held by tangential pump in handling small volumes at high pressure.

Types. Modern Pumping Equipment, F. J. Taylor. Mech. World, vol. 82, no. 2126, Sept. 30, 1927, pp. 241–253, 25 figs. Review of modern pumping practice, with description of different types of pumps and methods of operation and control.

PUMPS, CENTRIFUGAL

Dredging. Pumps for Excavation and Hydraulicking in Dredging Machines (Le Pompe Per Escavo e Refluimento nelle Macchine Effossorie), F. F. Smeraldi,

Annali dei Lavori Pubblici, vol. 45, nos. 3 and 4, Mar. and Apr., 1927, pp. 240–263 and 326–359, 16 figs. General directions for design of mud pumps and suction dredging apparatus; theoretical, mathematical analysis of losses of head, relation between pressure and velocity of liquid mud, characteristic curves and construction of Italian and other types of such pumps.

Selection of. The Selection of Centrifugal Pumps for Various Duties, G. A. Pullen. Domestic Eng. (Lond.), vol. 47, nos. 8 and 9, Aug. and Sept. 1927, pp. 156–164 and 182–188, 16 figs. Aug.: General principles; some types of pumps; pumps in series and parallel; suction; priming; discharge; velocity head. Sept.: Testing; measurement of speed and power; pumping liquids other than water; comparison of centrifugal and displacement pumps.

PYROMETERS

Heated-Thermometer Type. Measurement of Gas Temperatures (Die Messung von Gastemperaturen), H. Schmidt. Mitteilungen aus dem Kaiser-Wilhelm-Inst. für Eisenforschung zu Düsseldorf, vol. 14, no. 9, 1927, pp. 227–238, 30 figs. Description and numerous tests of modified aspiration pyrometer, which determines temperature of aspirated gas by bringing it in contact with an electrically heated thermometer and observing cooling or heating effect it has upon it; tests proved reliability, convenience and precision of this new type of pyrometer; critical discussion followed by suggestions on new methods of pyrometry.

R

RADIATORS

Design. Radiator Design, K. Meier. Domestic Eng., vol. 120, no. 11, Sept. 10, 1927, pp. 28–29, 5 figs. Development of radiators; problem of heat distribution.

Gas-Fired Steam. Gas-Fired Steam Radiators, H. T. Hall. Domestic Eng. (Chicago), vol. 120, no. 12 and vol. 121, no. 2, Sept. 17 and Oct. 8, 1927, pp. 22–24 and 24–26 and 67, 8 figs. Sept. 17: Data on initial and operating costs of gas-steam radiators. Oct. 8: Use of gas-fired steam radiators in shops, loft buildings, apartments and churches.

RAILS

Corrosion. Is the Control of Brine Drippings an Impossible Task? Ry. Eng. & Maintenance, vol. 23, no. 10, Oct. 1927, pp. 404–407, 2 figs. Various committee reports on corrosive effect of brine drippings from refrigerator cars; list of protective materials now in use or under test and results secured.

Guard. The Why and How of Guard Rails. Ry. Eng. & Maintenance, vol. 23, no. 10, Oct. 1927, pp. 401–402, 1 fig. Committee report of Metropolitan Track Supervisors' Club points to advantages of one-piece manganese construction for severe service.

Welding. Second Year's Experience with Rail Welding in the Nürnberg Division of State Railway Administration (Das zweite Betriebsjahr der Schienenschweissungen im Bezirk der Reichsbahndirektion Nürnberg), Schönberger. Organ für die Fortschritte des Eisenbahnwesens, vol. 82, no. 15, Aug. 15, 1927, pp. 275–279, 5 figs. Details of method of welding and 2 years' experience on an experimental stretch, 1289 m. long, showing highly satisfactory results.

RAILWAY ELECTRIFICATION

Great Northern. Great Northern Improvement Program, F. Mears. Gen. Elec. Rev., vol. 30, no. 10, Oct. 1927, pp. 472–473. Scope of project; new electrified zone; reduces grades and curves; America's longest tunnel.

Power for Great Northern Electrification Supplied by Puget Sound Power & Light Company, G. E. Quinan. Gen. Elec. Rev., vol. 30, no. 10, Oct. 1927, pp. 474–476, 3 figs. Power resources of territory; reasons for railroad purchasing rather than generating power; electric operation estimated to require 25,000 hp.

RAILWAY MANAGEMENT

Cost Accounting. Cost Accounting and the Operating Expense Classification, C. E. Parks. Ry. Age, vol. 83, nos. 8 and 11, Aug. 20 and Sept. 10, 1927, pp. 339–341, and 479–482. Aug. 20: Purpose of cost accounting in railroad industry; cost groups; results of cost accounting; elements of cost in railway operation. Sept. 10: How operating expense classification meets requirements of cost accounting.

RAILWAY MOTOR CARS

Steam. The Development of the Steam Rail Motor Car. Ry. Engr., vol. 49, no. 573, Oct. 1927, pp. 378–385, 14 figs. Details of Clayton steam cars and Egyptian State Railways car designed and built by Clayton Wagons Limited, of Lincoln, for service on the London & North Eastern and Egyptian State Railways.

RAILWAY REPAIR SHOPS

Brooklyn-Manhattan Transit Corp. B. M. T. Completes Coney Island Shops, W. G. Gove. Elec. Traction, vol. 23, no. 8, Aug. 1927, pp. 415–417. Twelve million dollar shops rapidly nearing completion designed for maintenance of two thousand cars; main building layout and equipment; store house, oil house, and office building; tool equipment. Abstract.

Cuba. Railway-Shop Work at Sagua, F. H. Colvin. Am. Mach., vol. 67, no. 12, Sept. 22, 1927, pp. 453–455, 7 figs. Some of machine equipment and shop-made devices that help to keep locomotives in service on an interior division in a sugar district of one of Cuban railways.

Locomotive. Locomotive Maintenance Work at Camaguey, Cuba, F. H. Colvin. Am. Mach., vol. 67, no. 14, Oct. 6, 1927, pp. 531–534, 11 figs. Machine-tool equipment and other devices in shops of Cuba Railway at Garido, near Camaguey.

Milling Machines. Where Savings Await Canadian Railroads, H. Rowland. Can. Machy. & Mfg. News, vol. 38, no. 17, Sept. 22, 1927, pp. 11–14, 8 figs. Describes use of milling machine in New England railway repair shop; adaptable to variety of work; increases production and saves time.

RAILWAY SIGNALING

Colored-Light Signals. Canadian National Signaling Construction Standards Are High. Ry. Signaling, vol. 20, no. 10, Oct. 1927, pp. 376–380, 10 figs. Completes 41-mile double-track installation of color-light signals on its main line between Chicago and Toronto; several novel departures in design and construction are found.

Color Light Signaling at York Road Station, Belfast. Ry. Gaz., vol. 47, no. 13, Sept. 23, 1927, pp. 366–369. In conjunction with permanent-way rearrangement, system of color-light signaling has been brought into use at L.M.S.R. Northern Counties Committee's Belfast Terminus, including unusual and noteworthy features.

Electric Power for. Electrical Power for Railway Signaling and Communications, M. G. Tweedie. Int. Ry. Congress Assn.—Bul., vol. 9, no. 9, Sept. 1927, pp. 773–806, 10 figs. Sources of supply usually available; circuits and apparatus using power; application of various sources of power to circuits and apparatus.

Remote Control. Remote Control of Railway Junctions, F. R. Wilson. Elec. Times, vol. 6, no. 8, Aug. 27, 1927, pp. 561–564, 7 figs. Describes electric power signaling system installed on Victorian Railways, and method of remote control.

RAILWAY SWITCHES

Remote Control. Canadian National Provides Remote Power Switches at International Bridge, C. H. Tillett. Ry. Signaling, vol. 20, no. 10, Oct. 1927, pp. 368–371, 10 figs. Ten switchmen and highway flagmen relieved by power operation of switches, bridge and rail locks, and gates for highway and pedestrian traffic.

Canadian Pacific Installs Signals and Remote Control Switches, C. R. Hodgdon. Ry. Signaling, vol. 20, no. 10, Oct. 1927, pp. 372–374, 6 figs. Seventy miles of single-track automatics, including three remote power switches, are operated by primary batteries.

RAILWAY TRACK

Maintenance. New Methods for Reinforcing Track and Ballast (Neue Wege zur Verstärkung des Oberbaues und des Bettungskörpers), A. Faatz. Organ für die Fortschritte des Eisenbahnwesens, vol. 82, no. 17, Sept. 15, 1927, pp. 315–319, 5 figs. Discusses improved methods of tamping, treating ties with tar, stuffing hollow steel ties with bituminous material, etc.

Second-Tracking Problems. Second Track Work Involves Extensive Line Revision. Ry. Age, vol. 83, no. 14, Oct. 1, 1927, pp. 633–637, 8 figs. Increased traffic on Missouri Pacific necessitates double tracks on several lines; 109 mi. of second-track work projected; problems presented by line revision.

RAILWAY YARDS

Classification. Putting 225 Cars an Hour Over Two Humps. Ry. Age, vol. 83, no. 14, Oct. 1, 1927, pp. 629–632. Reading makes excellent operating record in classifying heavy coal traffic in large yard at Rutherford, Pa.; yard facilities, operation, and employees.

REDUCTION GEARS

Limitations. Speed Reducers, C. H. Grill. Indus. Eng., vol. 85, no. 9, Sept. 1927, pp. 401–404, 6 figs. Some of the inherent limitations that must be considered when applying these devices to industrial power drives.

REFRACTORIES

Properties. Refractories: Their Properties and Adaptabilities, L. N. Rancke. Am. Gas Jl., vol. 127, no. 7, Sept. 1927, pp. 35–39. Defines and discusses use of acid, semi-basic, basic, and neutral refractories; functions of firebrick; refractory failures, etc.

REFRIGERATING MACHINES

Household Electric. Household Electric Refrigerating Machines (Haushalt-Kältemaschinen), R. Plank. V.D.I. Zeit., vol. 71, no. 40 and 41, Oct. 1 and 8, 1927, pp. 1381–1389 and 1436–1440, 37 figs. Discusses specifications for household refrigerators and describes principal American, German and Swiss makes of compression, absorption and adsorption types; German absorption machines treated in detail.

Lubrication. Effective Lubrication of Refrigeration Machinery, A. F. Brewer. So. Power Jl., vol. 45, no. 9, Sept. 1927, pp. 54–61, 12 figs. The nature of the process demands more careful study than does many other lubrication problems; refrigerant, the system, temperatures, size of equipment and other factors all set up limitations which must be religiously observed if continuous and efficient refrigeration is to be gained.

REFRIGERATING PLANTS

Operation. Cold Storage Operation and Computations, W. R. Woolrich. Power Plant Eng., vol. 31, no. 20, Oct. 15, 1927, pp. 1101–1104, 3 figs. Effect of various factors upon refrigerating requirements shown by calculation; effects of outside temperatures.

ROLLING MILLS

Bar Mills. New Alloy Bar Mill at Chicago. Iron Age, vol. 120, no. 11, Sept. 15, 1927, pp. 729–731, 4 figs. New 12- and 16-in. alloy steel bar mill of Illinois Steel Co. at South Works, Chicago; guarding the quality of the steel and rolling to commercially exact dimensions prime considerations in laying out and equipping plant.

Blooming and Slab. New Three-High Blooming and Slab Mill. Blast Furnace & Steel Plant, vol. 15, no. 9, Sept. 1927, pp. 441–443, 5 figs. Description of a mill built in Germany for an Italian works; method of operating discloses several novel features; all movements electrically controlled.

Continuous Skelp Mill. Wheeling Steel Corp.'s New Skelp Mill, D. N. Watkins. Blast Furnace & Steel Plant, vol. 15, no. 9, Sept. 1927, pp. 435–437, 8 figs. Mesta Machine Company has designed new type continuous electrically driven skelp mill using edging roll; special interest attached to new type electric flying shears.

Electric Drive. Recent Developments in Electric Drives for Rolling Mills, L. A. Umansky. Indus. Eng., vol. 85, no. 9, Sept. 1927, pp. 420–424, 8 figs. Describes several layouts for combination of electrical machines in various mills.

Machine Bearings. Economy of Bearings of Rolling Machines (Untersuchungen über die Wirtschaftlichkeit verschiedener Walzwerkslager), E. Cords. Stahl u. Eisen, vol. 47, no. 36, Sept. 8, 1927, pp. 1486–1489, 9 figs. Report of rolling mills committee of society of German iron metallurgists, dealing with power consumption of cogging, intermediate, finishing and high-speed rolling mills using metallic (plain and S.K.F.) pockwood bearings; shows superiority of latter.

Straighteners. Straightening Rolls for All Shapes of Structural Steel (Rollenrichtmaschinen für alle Arten von Profileisen), S. Weil. Centralblatt der Hütten u. Walzwerke, vol. 31, no. 32, Aug. 10, 1927, pp. 437–440, 6 figs. Construction and operation of newest models manufactured by Demag, of Duisburg, with one or two supports, for light and heavy sections, respectively.

Strip Mills. Trumbull Company's Wide Strip Mill. Iron Age, vol. 120, no. 11, Sept. 15, 1927, pp. 693–696, 6 figs. Describes new wide hot-strip mill placed in operation in June by Trumbull Steel Co.; ten horizontal stands and three edging mills; five finishing stands are four-high; large use of roller bearings.

Wooden Bearings. Wooden Bearings for Rolling Mills (Holzlager bei Walzwerken), A. Hülsewig. Stahl u. Eisen, vol. 47, no. 36, Sept. 8, 1927, pp. 1483–1485, 6 figs. Report of rolling-mills committee of Society of German iron metallurgists; on basis of practical experience, recommends use of bearings of red brass with cross-grain wooden, cylindrical pins and stoppers, parallel and normal to bearing axis, such bearings giving better service and lasting ten times as long as all-brass ones.

ROLLS

Bearings. Bearings of Rolls (Walzenlagerung), C. Turk. Stahl u. Eisen, vol. 47, no. 35, Sept. 1, 1927, pp. 1437–1443, 10 figs. Wood and occasionally wood and red brass were gradually substituted for red brass bearings of rolls at Völklingen mill; wood bearings, provided with central lubrication, also cause saving in electric current; improvements in roller-bearings assure their future use in bearings of rolls.

S

SCREW THREADS

Specifying. How to Specify Screw Threads, C. W. Bettcher. Iron Age, vol. 120, no. 12, Sept. 22, 1927, pp. 791–792. Nomenclature adopted in the report of the National Screw Thread Commission; also some considerations in connection with design of gages; use of recommended standard thread sizes important.

SEAPLANES

Development. Seaplane Development, R. E. Penny. Roy. Aeronautical Soc.-Jl., vol. 31, no. 201, Sept. 1927, pp. 844–874 and (discussion) 874–885, 30 figs. Touches on some of more important features of seaplane design; design of aircraft structure in relation to boat and float seaplane; hull and float design and construction progress in flying-boat design; future development of seaplane; stability problems of flying boats and float seaplanes.

Racers. The Kirkham "X" Racer. Aviation, vol. 23, no. 11, Sept. 12, 1927, pp. 585–586, 2 figs. Seaplane especially designed and built for Lieut. Williams, U. S. N., and powered with the new Packard 24-cylinder 1200-hp. engine.

SHAFTS

Whirling Speeds. Whirling Speeds of Shafts, T. M. Naylor. Engineering, vol. 124, no. 3221, Oct. 7, 1927, p. 474, 4 figs. Review of experimental and mathematical conclusions with regard to new whirling speed. Paper read before Section G of British Association.

STANDARDS

German DIN Reports. Report of German Standards Committee (DIN-Mitteilungen). Maschinenbau, vol. 6, no. 13, July 1, 1927, pp. 682–688. Proposed standards for railroad-car axles, wheel tires, wheel bodies and disks; also for bolts, check valves, nominal diameters of pipe lines and armatures, and for percussion-test specifications.

Report of German Industrial Standards Committee (DIN-Mitteilungen), W. Reichardt. Maschinenbau, vol. 6, no. 16, Aug. 18, 1927, pp. 829–840. Proposed standards for eye- and shackle-crane-hooks, nomen-

clature of cutting steels, also keyboards, cylinders and oil-cloth hoods for standard typewriters.

Report of German Industrial Standards Committee (DIN-Mitteilungen), Maschinenbau, vol. 6, no. 18, Sept. 15, 1927, pp. 925–932, 24 figs. Proposed standards for 10 kinds of horseshoeing hammers, pritchels, 5 kinds of tongs, compass, special knives and other horseshoeing implements.

Length. Temperature Adjustment of Length Standards (La température d'ajustage des étalons industriels, des vérificateurs et des pièces mécaniques), L. Graux. Génie Civil, vol. 91, no. 11, Sept. 10, 1927, pp. 250–252. Discusses adjustment on basis of standard meter at 0 deg. cent. or at +20 deg. cent.

STEAM

Underground Distribution Systems. Underground Steam Distribution Systems, L. A. Foster. Power Plant Eng., vol. 31, no. 20, Oct. 15, 1927, pp. 1096–1099, 4 figs. High-pressure steam from central boiler plant serves many purposes besides affording cleanliness, health and convenience in cities; adaptation of superheat; auxiliary equipment; economics.

STEAM ENGINES

Lentz. Design and Performance Characteristics of the Lentz Engine, S. J. H. White. Nat. Engr., vol. 31, no. 9, Sept. 1927, pp. 421–427, 8 figs. Discussion of different types of prime movers with description and advantages of Lentz engine.

Reciprocating. The Reciprocating Steam Engine: Its Present and Future Positions. Shipbldr., vol. 34, no. 206, Oct. 1927, pp. 512–513. Possibilities of reciprocating steam engine for ship propulsion; higher steam pressures and temperatures; superheated steam; valve arrangements; reciprocating engine of 500-lb. steam pressure; Bauer-Wach system of reciprocating engine and exhaust-steam turbine for single-shaft propulsion; uniflow engine.

Uniflow. The Engine of the Steamship Helvetie (Die hydraulisch gesteuerte 1500 PS Dreizylinder-Sulzer-Gleichstrom-Dampfmaschine des Salondampfers "Helvetie" auf dem Genfersee). Schweizerische Bauzeitung, vol. 90, no. 11, Sept. 10, 1927, pp. 135–139, 12 figs. Details of a hydraulically regulated 1500-hp. three-cylinder uniflow engine, manufactured by Sulzer A. G. for a saloon steamship, 1600 passengers' capacity, operating on Lake Geneva.

STEAM POWER PLANTS

Combined Power and Process. Combining Power and Process Steam, F. A. Krehbiel. Power, vol. 66, no. 15, Oct. 11, 1927, pp. 578–582, 9 figs. In 1500-kw. poppet-valve engine plant exhausting at 2 to 30 lb. pressure to process; twelve months' experience in powdered-coal operation; engine vibration experienced from faulty cylinder lubrication.

Illinois. Waukegan Places 50,000-Kw. Turbine Unit in Service. Power, vol. 66, no. 11, Sept. 13, 1927, pp. 386–389, 6 figs. New unit uses steam at 600 lb. pressure and 725 deg. fahr. superheat, and is bled at four points to heat feedwater; economizer and air preheaters are used; air temperature is raised to 350 deg. fahr. for use under chain grates; electrical features are two-motor drive of induced-draft fans, two-speed vertical motors for circulating pumps, full-voltage starting of 2300-volt auxiliary motors, metal-clad switchgear, busbars for all potentials and armored cables for all auxiliary services; main 12,000-volt Reyrolle switches are reported to be largest of their kind in world.

Klingenberg, Berlin. The Klingenberg Power Plant of the City of Berlin, A. Heller. Eng. Progress, vol. 8, no. 9, Sept. 1927, pp. 225–230, 8 figs. Details of new station with present capacity of 300,000 kva.; coal-handling equipment; boiler plant, etc.

Peoria, Ill. Steam Economy at the Peoria Plant of the Commercial Solvents Corporation, W. I. Nevius. Power, vol. 66, no. 12, Sept. 20, 1927, pp. 438–440, 4 figs. How substantial savings were effected in spite of cheap coal and simple plant layout.

Steam Pressure for. Selection of Steam Pressure for Modern Power Plants (Die Wahl des Dampfdruckes in neuzeitlichen Elektrizitätswerken), H. Gleichmann. Elektrizitätswirtschaft, vol. 46, no. 436, June 2, 1927, pp. 283–291, 6 figs. Discusses steam pressure as only one of number of factors determining efficiency of steam power plants; reviews recent types and practices of generating electricity by steam.

Toronto, Canada. Proposed Auxiliary Steam Plant, Toronto. Can. Engr., vol. 53, no. 11, Sept. 13, 1927, pp. 297–299. Engineers report that operation of steam power plant in conjunction with Toronto hydroelectric system would result in substantial savings under certain conditions; analysis of costs.

STEAM TURBINES

Blades, Vibration of. Vibration Periods of Groups of Steam-Turbine Blades (Uber die Eigenfrequenzen der Schaufelgruppen von Dampfturbinen), E. Schwerin. Zeit. für Technische Physik, no. 8, 1927, pp. 312–319, 5 figs. Mathematical analysis, with numerical examples, showing difference in vibration periods of individual blades and groups of blades.

Bleeder. Calculating Extraction Turbine Performance, K. S. Kramer. Power Plant Eng., vol. 31, no. 20, Oct. 15, 1927, pp. 1075–1076, 2 figs. Details of method used in locating feedwater heaters for best economy, calculating steam to be bled, and gain in efficiency over non-extraction operation.

Heavy-Duty. Heavy-Duty Steam Turbines (Grossdampfturbinen), A. Kraft. Elektrotechnik u. Maschinenbau, vol. 45, no. 39, Sept. 25, 1927, pp. 804–812, 9 figs. Describes some of most powerful turbines in world; notably those of Klingenberg plant near Berlin; details of turbines with two, three and four casings developing as much as 80,000 kw. at 1500 r.p.m.; notes tendency to substitute mixed vapors for pure steam.

STEEL

Automobile Bodies. Steel Required in Automobile Bodies. Iron Age, vol. 120, no. 12, Sept. 22, 1927, pp. 779–781, 6 figs. Special qualities in sheets more successfully obtained by showing steel manufacturers exact requirements than by buying on strict specifications; developments in use of steel for automobile bodies by Edward G. Budd Mfg. Co.

Cold Rolling. The Influence of Cold-Rolling and Subsequent Annealing on the Hardness of Mild Steel, C. A. Edwards and K. Kuwada. Iron & Steel Inst.—Advance Paper, no. 3, Sept. 1927, 17 pp., 15 figs. Also Iron & Coal Trades Rev., vol. 115, no. 3109, Sept. 30, 1927, pp. 496–498, 15 figs. Describes experiments to determine influence of varying degrees of cold work, in the form of cold rolling, in the direction of increasing the hardness of mild steel and the temperatures at which this additional hardness is removed; material used for experiments was a low-carbon steel sheet 3 ft. by 2 ft., and approximately 1.3 mm. in thickness.

Cold-Worked. Plastic Flow and the Strength of Cold-Worked Steel, E. B. Norris. Eng. News-Rec., vol. 99, no. 14, Oct. 6, 1927, pp. 548–549, 3 figs. Stress referred to reduced cross-section; test results; correlation of stress and reduction of diameter.

Effect of Temperature on Properties. Effect of Temperature on the Mechanical and Microscopic Properties of Steel, G. C. Priester and O. E. Harder. Am. Soc. for Steel Treat.—Trans., vol. 12, no. 3, Sept. 1927, pp. 436–445, 12 figs. Describes results obtained on tests of a quenched 0.29 per cent carbon steel at temperatures up to 1112 deg. fahr. (600 deg. cent.) and on same steel as hardened, tempered at temperatures up to 1112 deg. fahr. (600 deg. cent.) and then tested at room temperature; only tensile strength tests were made at elevated temperatures; tests at room temperature include hardness and impact toughness.

Hardness. The Work-Hardening of Steel By Abrasion, E. G. Herbert. Iron & Steel Inst.—Advance Paper, no. 7, Sept. 1927, 12 pp., 12 figs. Describes an investigation into hardness induced by severe abrasion in locomotive tires and rails, and in hardened steel gears and cams from motor-cars; hardness induced by wear is compared with the "maximum induced hardness" measured by a recently developed test made with pendulum hardness tester.

Nickel. See NICKEL STEEL.

Normal. Am. Soc. for Steel Treat.—Trans., vol. 12, no. 3, Sept. 1927, pp. 413–435 and 478, 45 figs. Discussion of paper by J. D. Gat and by S. Epstein and H. S. Rawdon on normal and abnormal steel; includes results of investigation conducted to show that structural abnormality is not inherent and can be introduced by selective straining.

Normality of Steel, J. D. Gat. Am. Soc. for Steel Treat.—Trans., vol. 12, no. 3, Sept. 1927, pp. 376–413, 28 figs. Paper written to bring better understanding of term "normality of steel" and properties possessed by steels classified as abnormal; describes experiments to demonstrate behavior of steels having different grain size and amounts of segregated cementite; properties of "cementitic lining" present in abnormal steels; concludes that resistance to uniform hardening is caused by high oxygen content forming a eutectoid alloy with the constituents of austenite.

Normal and Abnormal. Progress in Study of Normal and Abnormal Steel, S. Epstein and H. S. Rawdon. Am. Soc. for Steel Treat.—Trans., vol. 12, no. 3, Sept. 1927, pp. 337–375, 21 figs. Normal and abnormal steel defined and characteristics of normal and abnormal structure in carburizing steel and tool steel illustrated; shows that under certain quenching conditions abnormal steel is more prone to give soft spots than normal steel, but that with drastic quenching in brine or in a sodium-hydroxide solution, it is possible completely to prevent formation of soft spots in both normal and abnormal steel; normality and abnormality have origin in deoxidation procedure of steel making; additions of aluminum and ferrovanadium in mold produced abnormality.

STEEL CASTINGS

Feeding and Gating. The Feeding and Gating of Steel Castings, A. Rhydderch. Foundry Trade Jl., vol. 36, no. 578, Sept. 15, 1927, pp. 233–236. Introduction to fundamental principles and considerations in gating and feeding of steel castings; follows path of metal from time it leaves ladle until castings are completed.

Manganese-Steel. Precision Equipment Finishes Manganese Steel Parts Rapidly. Abrasive Industry, vol. 8, no. 10, Oct. 1927, pp. 320–323, 8 figs. Cleaning room equipment of Chicago Heights plant of Am. Manganese Steel Co.; selection and testing of grinding wheels.

STEEL FOUNDRIES

Equipment Maintenance. Details of a Simple Equipment Record System Used in a Large Steel Foundry, J. Thomson. Indus. Eng., vol. 85, no. 9, Sept. 1927, pp. 415–419 and 435, 8 figs. Necessity for keeping equipment in perfect working condition and study of system in use by Hubbard Steel Foundry Co., East Chicago, for its equipment maintenance records.

STEEL, HEAT TREATMENT OF

Annealing. Electric Annealing Solves Machining Problem at Timken Plant. Elec. World, vol. 90, no. 15, Oct. 8, 1927, pp. 729–730. Exacting requirements in heat-treating high-carbon, high-chromium steel; 850-kw. pit-type electric furnace anneals 84-ton charge of steel bars.

Bibliography. Books on the Heat Treatment of Steel, E. H. McClelland. Forging-Stamping-Heat Treating, vol. 13, no. 9, Sept. 1927, pp. 369–371. Treatises written in English, French, and German, dealing with the subject in all its branches; most of the publications are modern.

Effect of. The Heat Treatment of Various Steels, L. C. Miller. Forging-Stamping-Heat Treating, vol. 13, no. 9, Sept. 1927, pp. 362–365. Effects of various chemical elements on the method of heat treatment and resultant physical properties of steels.

High-Speed Steel. Production Heat-Treatment of High-Speed Steel, E. N. Brookings. Am. Mach., vol. 67, no. 17, Oct. 27, 1927, pp. 641–643, 3 figs. Process of heat treatment that insures as far as possible a uniform quality product, and at same time allows for quantity production.

Hump Method. The Hump Method of Heat Treating, J. W. Harsch. Forging-Stamping-Heat Treating, vol. 13, no. 9, Sept. 1927, pp. 372–373, 4 figs. Description of a means for determining the critical point based on the expansion nad contraction of steel when subject to heat; chart records change in object.

Principles. Facts and Principles Concerning Steel and Heat Treatment, H. B. Knowlton. Am. Soc. for Steel Treat.—Trans., vol. 12, no. 3, Sept. 1927, pp. 479–491, 3 figs. Use of vanadium in various types of steel; heat treatments, properties, and uses of different types of steel are described.

Tempering. On the Mechanism of the Tempering of Steels, T. Matsushita and K. Nagasawa. Iron & Steel Inst.—Advance Paper, no. 10, Sept. 1927, 12 pp., 10 figs. In the course of investigation of physical properties of quenched steels during tempering, authors observed some unexpected facts which have an important bearing on elucidation of phenomenon of tempering; present paper contains a description of these phenomena, and also a new view concerning mechanism of tempering. Bibliography.

STEEL WORKS

Power Plant for. Economical Steel Plant Power, T. J. Ess. Power Plant Eng., vol. 31, no. 18, Sept. 15, 1927, pp. 966–972, 11 figs. Modern industrial power plant built to provide facilities for supplying air to blast furnace and to furnish power for furnace and steel mills at Massillon Works of Central Alloy Steel Corp.; burns blast-furnace gas, pulverized coal, and coke with efficiencies as high as 88 per cent; present capacity, 10,000 kw.

Willys-Overland, Toledo. Willys-Overland Forge and Treating Shop, C. Longenecker. Forging-Stamping-Heat Treating, vol. 13, no. 9, Sept. 1927, pp. 355–359, 6 figs. Describes new forge and heat-treating shop of Willys-Overland Co., Toledo; possesses many features novel to plants of this nature.

STOKERS

Chain-Grate. Increasing the Efficiency of Chain Grate Stokers, A. E. Grunert. Indus. Power, vol. 8, no. 3, Sept. 1927, pp. 45–47 and 66–72, 2 figs. Composition of combustion gases from fuel bed of chain-grate stoker is such that further development of furnace must take wide variations of conditions into account; investigations as to character of gases arising from fuel bed with idea of finding some means of reducing objectionable conditions usually encountered.

T

TAPS

Design and Construction. Design and Construction of Taps, A. L. Valentine. Machy. (Lond), vol. 30, no. 778, Sept. 8, 1927, pp. 705–709, 4 figs. Deals with Acme-thread taps, square-thread taps, staybolt taps, and taper-threaded taps.

TERMINALS, RAILWAY

Toronto. Toronto Union Station, History, Description, Etc. Can. Ry. & Mar. World, no. 356, Oct. 1927, pp. 567–576, 13 figs. Description of various sections of new Union Station at Toronto; general design of buildings, ramp chamber, general waiting room, ticket lobby, rest rooms, dining room and concourse; heating, ventilating and refrigeration; lighting; water and gas supply and fire protection; elevators.

TEXTILE MILLS

Electric Power for. Nashawena Mills Has 5 Kva. Per Worker, H. S. Knowlton. Elec. World, vol. 90, no. 14, Oct. 1, 1927, pp. 689–694. Engineering data upon more essential and advanced applications of electricity in Nashawena Mills, at New Bedford, Mass., which manufactures 400 differentiated textile products.

Reliable Industrial Power Supply. Elec. World, vol. 90, no. 14, Oct. 1, 1927, pp. 660–662, 4 figs. Fall River Elec. Light Co., plans progressive development of feeder layouts to supply widely separated textile mills; effective relay installation.

TEXTILES

Automobile Industry. Coated Textile, H. Bradshaw. Indus. & Eng. Chem., vol. 19, no. 10, Oct. 1927, pp. 1109–1110. Three types of coated textiles whose basic materials are, respectively, pyroxylin, linseed oil, and rubber, and their contribution to the economic development of the automobile.

Celanese. "Celanese" Manufacture: A New Canadian Industry, H. Price. Can. Chem. & Metallurgy, vol. 11, no. 10, Oct. 1927, pp. 269–270. Development of manufacture of new textile and description of process.

TIME STUDY

Labor Budget and. Time-Study in Its Relation to Labor Budget, E. J. Frounfelker. Soc. Automotive

Engrs.—Jl., vol. 21, no. 4, Oct. 1927, pp. 386-387. Outlines method of Continental Motors Corp., Detroit, for predetermination of labor costs; labor cost is budgeted after careful analysis in which tools, equipment, comparison with other models, and itemized time elements are considered in sequence in which they are to be performed; analysis of different time elements; summary of advantages of method described and results obtained.

Rolling Mills. Controlling Operation Through Time Keeping (Betriebskontrolle durch Zeitmessung), A. Körver. Centralblatt der Hütten u. Walzwerke, vol. 31, no. 35, Aug. 31, 1927, pp. 487-492, 4 figs. Examples of and proposals for use of time recorders, with circular chart or band records, in operation of rolling mills.

TIN ALLOYS

Lead-Tin. Effect of Work and Annealing on the Lead-Tin Eutectic, F. Hargreaves. Inst. of Metals—Advance Paper, no. 444, 1927, 12 pp., 6 figs. Marked softening action of work air temperature on lead-tin eutectic; effect of different degrees of working; annealing at air temperature and at 100 deg. cent. for different periods and effect on rate and extent of recovery in hardness; effect of annealing at just below the melting point.

TOOLS

High-Frequency Portable. High-Frequency Portable Tools Effecting Economies. Automotive Industries, vol. 57, no. 14, Oct. 1, 1927, pp. 480-484, 11 figs. Rather recent development in portable-tool field and one which appears to be of considerable importance from standpoint of production economies is type of tool powered with polyphase induction motor operated on high-frequency current; usually 180 cycles; principal feature of this type of tool.

TRACTORS

Farm. Value of the Motor Tractor in Agricultural Work (Der Wert des Motorschleppers für die Landwirtschaft), P. Friedmann. Fördertechnik u. Frachtverkehr, vol. 20, no. 3, Feb. 4, 1927, pp. 45-50, 16 figs. German types of wheel and caterpillar tractors and their use in plowing, disk-harrowing, rolling, threshing, etc.; comparative cost data.

Agricultural Tractor Operating on Producer Gas. Engineering, vol. 124, no. 3208, July 8, 1927, p. 54, 2 figs. Tractor manufactured by Peter Brotherhood, Ltd., fitted with four-cylinder engine developing 306 hp. at 900 r.p.m., on paraffin.

TUBES

Temperature Stresses. The Calculation of Temperature Stresses in Tubes, L. H. Barker. Engineering, vol. 124, no. 3221, Oct. 7, 1927, pp. 443-444, 6 figs. Deals only with stresses that are set up by a radial temperature difference.

V

VALVE GEARS

Four Valves Per Cylinder. A New Valve Gear. Automobile Engr., vol. 17, no. 229, June 1927, p. 226, 1 fig. Operating mechanism for four valves per cylinder; design produced and patented by A. H. Wilde, of Hotchkiss Automobile Co. of Paris, combines advantages of reduced overall height while leaving space necessary for mounting intake and exhaust manifolds.

VENTILATION

Air Currents. Air Currents for Ventilation, T. N. Thomson. Plumbers Trade Jl., vol. 83, no. 1, July 1, 1927, pp. 22-25. How to secure proper distribution of fresh air to rooms for ventilation purposes.

Future Prospects. The Future of Ventilation, C. F. Wolfsfeld. Heat. & Vent. Mag., vol. 24, no. 6, June 1927, pp. 55-57, 3 figs. Importance of selling idea to public with suggested method for duplicating mild outdoor conditions.

Motion-Picture Theaters. Air Regulation in Public Entertainment Places (Il condizionamento dell'aria nei locali di pubblico divertimento), V. Piretta. Ingegneria, vol. 6, no. 4, Apr. 1927, pp. 136-139, 1 fig. Computing required capacity of refrigerating and ventilating plant for Turin motion-picture theater of 14,000 cu. m. in volume, having seating capacity of 2000.

Piping. Bends in Ventilation Piping, R. A. H. Flugge-de-Smidt. Chem. Met. & Min. Soc. of S. Africa—Jl., vol. 27, no. 9, Mar. 1927, pp. 193-194, 1 fig. While installing system of 20-in. galvanized ventilating pipe it was brought home to author how very much more expensive curved piping was than straight lengths; by having straight lengths cut off at certain angles it was found possible to negotiate all various twists and turns and, as piping cut off at angle was only shade more expensive than similar lengths cut square, considerable saving was effected.

Plating Rooms. Pure Air Vital to Planters' Efficiency, W. S. Barrows. Can. Foundryman, vol. 18, no. 6, June 1927, pp. 15-20, 3 figs. Account of author's experience in plating-room ventilation.

Schools. The Mechanical Ventilation of the St. Louis Schools, E. S. Hallett. Heat. & Vent. Mag., vol. 24, nos. 1, 2, 3, 4, 5 and 6, Jan., Feb., Mar., Apr., May and June 1927, pp. 65-68, 83-85 and 87, 84-86, 79-81 and 84, 73-79 and 73-74, 17 figs. New type of ventilation, in which power plant is built integral with heating system, consisting of two 350-hp. cross-drum water-tube boilers, with chain grates, only one of which will ever be used at time; power is generated as matter of economy since most of exhaust steam is used for heating and other purposes; no direct radiation is used; simplicity of air distribution; air velocities; temperature control.

VISCOSIMETERS

Pendulum. A New Viscosimeter (Ein neuer Zähigkeitsprüfer (Viskosimeter)), Albrecht and Wolff. V.D.I. Zeit., vol. 71, no. 37, Sept. 16, 1927, pp. 1299-1303, 21 figs. Describes Spindler & Hoyer (Goettingen) instrument, in successful use by Deutsche Reichsbahn Gesellschaft, which measures viscosity by means of pendulum made to oscillate in medium tested; viscosity is indicated by time it takes to dampen oscillations.

W

WAGES

Group-Bonus Incentive Plan. Resolved: That a Group Bonus Incentive Plan Is Better, for All Concerned, Than Either a Piece Rate or Straight Day Rate. Soc. Indus. Engrs.—Bul., vol. 9, no. 5-6, May-June 1927, pp. 5-16. Debate between Affirmative: W. R. Tuttle, G. L. Mueller, and Negative: W. Allen, T. E. Moon.

Incentives. Financial Incentives, E. D. Smith. Taylor Soc.—Bul., vol. 12, no. 3, June 1927, pp. 425-431 and (discussion) 431-441. Time payments; payment for work done; general principles; financial incentives cannot be successfully considered as thing apart from management; they are integral elements in management and with it form an inseparable whole.

Payment Systems. Systems of Remuneration, A. Ramsay. Engineering, vol. 123, no. 3205, June 17, 1927, pp. 721-722. Particulars of various accepted systems of wage payments.

WASTE ELIMINATION

Industrial. Labor's Interest in Industrial Waste Elimination. Taylor Soc.—Bul., vol. 12, no. 3, June 1927, pp. 407-424. Four papers presented before conference on elimination of waste in industry as follows: Labor and Waste Elimination, by W. Green; Waste Elimination in the Full Fashioned Hosiery Industry, G. Geiges; Workers' Participation in Job Study, G. C. Brown; Scientific Management and Waste Elimination, F. J. Miller.

WASTE HEAT

Utilization. Waste Heat Utilization in Compressor Plants, F. L. Kallam. Nat. Petroleum News, vol. 19, no. 38, Sept. 21, 1927, pp. 218-224, 1 fig. Points out causes for increased interest in compression gasoline system and shows that stabilizer affords means of utilizing compressor-plant heat, thereby greatly increasing economy of heat.

WATER SOFTENING

Advantages. Water Softening as an Adjunct to Water Purification, C. P. Hoover. Am. Water Wks. Assn.—Jl., vol. 17, no. 6, June 1927, pp. 751-759. Reason why so few softening plants were built; recarbonization and other developments; use of coagulants in softening; zeolite process; operation of lime-zeolite softening plant; differences between water filtration and water softening; advantages of softening. See abstract in Water Works Eng., vol. 80, no. 13, July 6, 1927, pp. 991-992 and 1019-1020, 8 figs.

Glauconite. Glauconite in Water Softening, R. H. Emerick. Power, vol. 66, no. 11, Sept. 13, 1927, p. 401. Author distinguishes between glauconite and zeolite and presents evidence to show that it is former and not latter that possesses water-softening properties; its origin and preparation are also discussed.

Zeolite. Zeolite Water Softening Treatment, R. M. Moore. Nat. Petroleum News, vol. 19, no. 38, Sept. 21, 1927, pp. 283-284, 1 fig. Zeolite method of softening hard water, with particular reference to work of oil companies.

WELDING

Aircraft Construction. Welding the Aircraft Structure, J. B. Johnson. Am. Welding Soc.—Jl., vol. 6, no. 9, Sept. 1927, pp. 102-114, 13 figs. Advance in welding for construction of various units of airplane structure; materials used and their weldability; tests of welded structures.

Aluminum Sheet. Welding Pure Aluminum Sheet. Automotive Mfr., vol. 69, no. 6, Sept. 1927, pp. 17-19, 7 figs. Wide use of this material furnishes opportunities for fabricating special equipment; strength of welds; technique of work.

Automobile Parts. Building Passenger Automobiles. Can. Machy. & Mfg. News, vol. 38, no. 16, Sept. 15, 1927, pp. 17-22 and 28. Influence of welding in construction, maintenance, and operation of automobiles.

Welding of Automobile Parts, W. C. Happ. Am. Welding Soc.—Jl., vol. 6, no. 9, Sept. 1927, pp. 24-29. Explains in a general way what has been accomplished in general welding practices at the South Bend Plants of The Studebaker Corporation.

Cast Iron. Cast Iron Welding (Gusseisenschweissungen), O. Bardtke. Giesserei-Zeitung, vol. 24, no. 18, Sept. 15, 1927, pp. 505-515, 39 figs. Discussion reviewing methods of electrical and oxyacetylene welding as applied to iron castings, with many examples from practice.

Electric. See ELECTRIC WELDING, ARC.

High-Temperature. Elevated Temperature Tests of Welds, K. V. Land and C. Moser. Am. Welding Soc.—Jl., vol. 6, no. 9, Sept. 1927, pp. 30-45, 18 figs. Preliminary report of tests conducted jointly by San Francisco Section of Am. Welding Soc., and Matls. Test. Lab., Leland Stanford Jr. Univ.; covers first two phases of investigation, the assembly and proofing of equipment, and preliminary tests of a number of specimens for purpose of comparing various welding rods submitted.

Metallography and. Metallography and the Welder, A. G. Odell. Acetylene Jl., vol. 29, no. 3, Sept. 1927, pp. 99-101, 6 figs. How this science, aided by physics and chemistry, aids the student of welding to make an accurate check on his progress.

Oxyacetylene. See OXYACETYLENE WELDING.

Railway Cars. The Use of Welding in Car Construction, V. R. Willoughby. Am. Welding Soc.—Jl., vol. 6, no. 9, Sept. 1927, pp. 11-24, 5 figs. Arguments for welded construction of railway cars; consideration of objections; comparison with riveted construction.

Steel Plate. Welding in the Design of Steel Plate Work, L. J. Sforzini. Am. Welding Soc.—Jl., vol. 6, no. 9, Sept. 1927, pp. 77-95, 11 figs. Discussion of riveting and fusion welding of steel plates; brief consideration of other processes.

WELDS

Metallurgy of. Some Metallurgical Observations on Welding, G. R. Brophy. Am. Welding Soc.—Jl., vol. 6, no. 9, Sept. 1927, pp. 67-76, 21 figs. Metallurgical aspects of welding and choice of materials used; bare and coated electrodes; plate stock; metallographic structure of welds; gas shields.

WIRE DRAWING

Plants. Rod-Rolling and Wire-Drawing, J. P. Bedson and J. S. G. Primrose. Iron & Coal Trades Rev., vol. 115, no. 3104, Aug. 26, 1927, pp. 289-292, 5 figs. Methods at Bradford Iron Works in Manchester, England; plant layout, continuous rod mills, processes. Paper read before West of Scotland Iron & Steel Inst. and printed in "Journal" of Inst.

Rod Preparation. The Preparation of Wire Rod for Drawing, J. D. Brunton. Wire & Wire Products, vol. 2, no. 9, Sept. 1927, pp. 303-305 and 319-321, 6 figs. British practice in pointing, pickling and conveying of material.

WOOD PRESERVATION

Creosoting Plant. Creosoting Plant Design, B. S. Nelson. Louisiana Eng. Soc.—Proc., vol. 13, no. 3, June 1927, pp. 112-122 and (discussion) 123-128. Discusses problems of engineering design of creosoting plants and states that design should be made by mechanical engineer.

Experiments. Experiments in Wood Preservation, L. P. Curtin. Indus. & Eng. Chem., vol. 19, no. 10, Oct. 1927, pp. 1159-1161. Effect on fungi of certain substances of alkaline or basic nature which do not contain ions commonly regarded as poisonous.

Paint Tests. Suggestions for Making Exposure Tests of Paints on Wood, H. A. Gardner. Am. Paint & Varnish Mfrs.' Assn.—Scientific Section, no. 314, Aug. 1927, pp. 421-438, 8 figs. Exposure tests on small panels; type of wood for tests; color of paint used; angle of exposure; effect of climatic conditions; A.S.T.M. method for reporting tests; etc.

Shale Oil. Possible Use of Shale Oil as a Wood Preservative, A. M. Sowder. Indus. & Eng. Chem., vol. 19, no. 10, Oct. 1927, pp. 1180-1182. Describes common methods of determining effectiveness of wood preservatives; test of shale oil by these methods and results obtained.

WOODWORKING MACHINERY

Tenoner. Operating and Adjusting the Single-end Tenoner. Wood-Worker, vol. 46, no. 7, Sept. 1927, pp. 43-44. Discussion of possibilities of modern tenoner, with suggestions as to methods and devices for securing maximum production.

WOODWORKING PLANTS

Modern. An Outstanding Wood-working Establishment, T. Hunter. Wood-Worker, vol. 46, no. 7, Sept. 1927, pp. 46-48, 7 figs. New production building of Am. Seating Co., Grand Rapids, Mich., represents an outstanding example of last word in design, layout and construction, with equipment of latest type for moving material and working wood.

Refuse Firing. The Automatic Firing of Wood Refuse, W. H. Rohr. Wood-Worker, vol. 46, no. 7, Sept. 1927, pp. 28-29, 7 figs. In the new boiler house recently erected by G. I. Sellers & Sons Co., Elwood, Ind., all of the latest equipment has been installed for automatically storing, transferring and firing wood refuse for the generation of steam.

Safety in. Salvage and Safety in Wood-working Plants. Wood-Worker, vol. 46, no. 7, Sept. 1927, pp. 25-26. Safety precautions and devices, intelligently used, together with education of personnel in safety matters, will not only reduce the physical accident hazard but will also reduce the number of accidents to machinery and other equipment.

Tool Records. Keeping the Tool Costs at a Minimum, H. J. Coane. Wood-Worker, vol. 46, no. 7, Sept. 1927, pp. 35-36. Describes a system for keeping track of tool costs, also a check on lost or damaged tools, which has proved well worth while in a woodworking plant where it is now in use.

Waste Utilization. Power from Production Waste, E. F. Roberts. Factory, vol. 39, no. 3, Sept. 1927, pp. 481-488. Packard Motor Car Co. uses refuse from woodmill at body plant for fuel; description of equipment installed to convert waste into steam; savings resulting.

Sawdust and Powdered Coal Burned Together, D. J. Lyons. Power Plant Eng., vol. 31, no. 18, Sept. 15, 1927, pp. 974-976, 4 figs. Modern power plant with an efficient cyclone system for collecting sawdust and shavings solves wood-refuse problem for Hayes Wheel Co.

MECHANICAL ENGINEERING

Published by The American Society of Mechanical Engineers, 29 W. 39th St., New York, N. Y.

VOL. 49, NO. 12. IN TWO SECTIONS - SECTION TWO. DECEMBER, 1927.

NEW YORK POWER SHOW

A·S·M·E GUIDE

CONTENTS

SIXTH

NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING

At the ~ Grand Central Palace ~ New York, N.Y.

December 5th to 10th, 1927

Sixth National Exposition of Power and Mechanical Engineering

The personal attendance of A.S.M.E. members at the New York "Power Show" always runs into thousands, and constitutes a very important part of its value to exhibitors; but it is unfortunately true, nevertheless, that the majority of members are obliged to depend upon printed descriptions for accurate information regarding the concerns exhibiting and the products shown. Although no printed description can ever take the place of a personal visit, it has become increasingly evident that the annual "A.S.M.E. Guide to the New York Power Show"—originally conceived as an aid to A.S.M.E. members while attending the Show in person—is also extremely valuable to those who are prevented by business or personal responsibilities from being in New York City during the week of the A.S.M.E. Annual Meeting and the Power Show.

Even for those who are able to spend an afternoon or an evening at the Show, it is quite a task to make a complete inspection of the more than 400 booths which now invite attention; and in many of which, alone, the average visitor could spend a large part of his available time to advantage.

Preliminary study of the "Guide" before visiting the Power Show helps to overcome this difficulty by enabling a prospective visitor to select in advance those exhibits which seem most likely to be of definite value to him; and to give them first attention during his visit. In many instances also, the Guide will prove valuable after a visitor has left the Show as a means of checking up names, addresses, or details regarding the equipment examined.

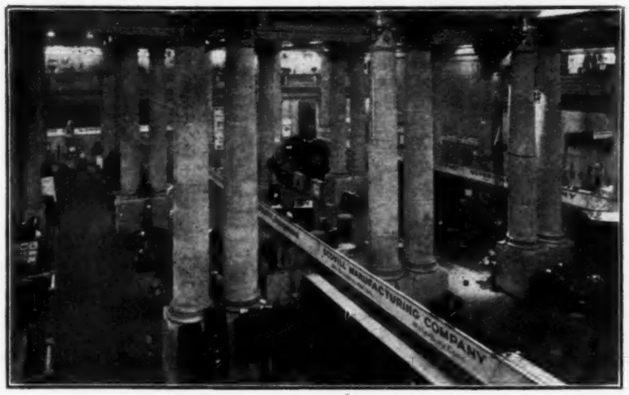
Continued on Page 5

Sixth National Exposition of Power and Mechanical Engineering

Continued from Page 3

The value to the entire A.S.M.E. membership of an adequate printed record of the concerns exhibiting at the Power Show, and of the nature of their respective exhibits, has thus become so thoroughly evident that Mechanical Engineering presents this year, for the first time, a complete "Directory of Exhibitors" giving a brief description of each exhibit so far as it has been possible to secure the information in advance of the Show. This data, which begins on page 9 and extends to page 33, has been compiled very carefully, and checked by the Management of the Exposition; but we cannot guarantee its accuracy in detail because of inevitable changes between the date of going to press and the opening of the Show. The names of concerns presenting advertisements in the "Guide" appear in color with a reference to the page or pages, upon which their advertisement appears.

In each write-up the number, or numbers, of the booths occupied are given, so that turning to the floor-space diagrams shown on pages 35, 37, 39 and 41, a user of the Guide at the Show can readily locate any booth in which he is interested. A.S.M.E. members are especially invited to visit the A.S.M.E. Booth(No. 80) on the main floor near the front entrance, where members of the Staff will be in attendance throughout the Show, and full information regarding A.S.M.E. activities and publications will be available.



Present indications point to an even better Show this year than heretofore. The exhibits promise to be more varied and impressive than they were last year; while the usual national character of the attendance will achieve an international aspect through the presence of officially delegated observers from several foreign countries. A preliminary analysis of the exhibits, furnished by the Management of the Exposition shows that 450 exhibits will contain machinery or equipment for the generation, distribution or utilization of Power; 225 exhibits will relate to heating, ventilating or refrigeration; 100 will show instruments for indication or control of pressure, temperature, volume, time, or speed; and 100 will show some form of machine shop or metal-working equipment. Most of the exhibits, of course, are counted under more than one of these classifications; and many could appropriately come under other classifications

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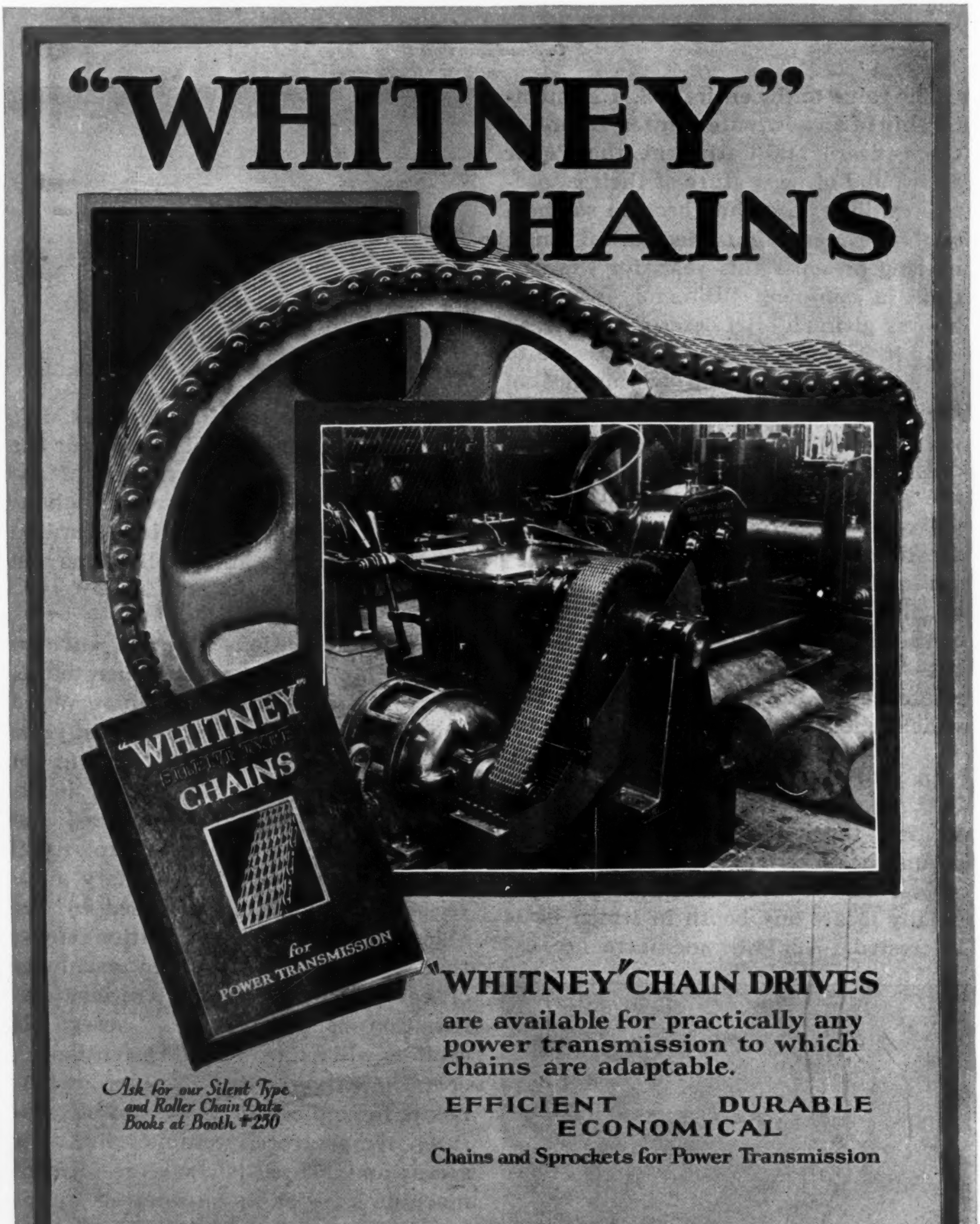
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"WHITNEY" CHAINS
for POWER TRANSMISSION
Ask for our Silent Type and Roller Chain Data Books at Booth #250
"WHITNEY" CHAIN DRIVES
are available for practically any power transmission to which chains are adaptable.
EFFICIENT DURABLE
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Chains and Sprockets for Power Transmission
THE WHITNEY MFG. CO.
HARTFORD, CONNECTICUT

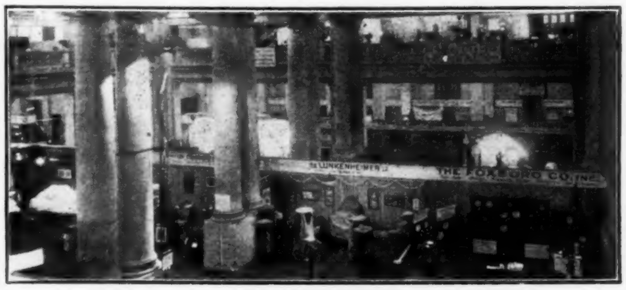
Sixth National Exposition of Power and Mechanical Engineering

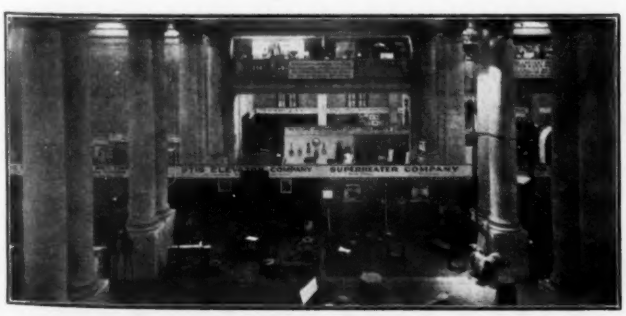
Continued from Page 5

such as material handling, engineering materials, etc.

The American Society of Mechanical Engineers has no financial interest in the "Power Show" and no direct voice in its management, but because of its educational value the Society has always kept in close touch with its development. An Advisory Committee of prominent engineers, most of whom are A.S.M.E. members, has been consulted with by the International Exposition Company on all matters of a technical nature; and particularly on those which had a bearing on A.S.M.E. affairs.

Aside from its commercial aspect the Exposition offers other distinctive opportunities which, although less obvious, are almost as important in their contribution toward the upbuilding of the engineering industries. Those of our members whose connection with mechanical engineering matters has become highly specialized will find it an enjoyable means of "brushing up" their general knowledge; and of securing a personal contact with more recent developments, regarding which they might otherwise be too much dependent on their engineering associates or assistants. The younger members, on the other hand, and particularly those who are just entering the engineering field, may readily secure a fund of practical and commercial





information which will constitute an important supplement to their recent technical education.

As in previous years the Power Show is being held during the same week as the A.S.M.E. Annual Meeting; and a special invitation is extended to all A.S.M.E. members to attend. Tickets of admission can be had without charge at A.S. M.E. headquarters; and an A.S.M.E. emblem seldom fails to secure for its wearer even more than the usual degree of courteous attention accorded to visitors at booths. In many cases the managers of the booths are A.S.M.E. members themselves; and are glad, accordingly, to welcome a visitor with whom they have a common interest.

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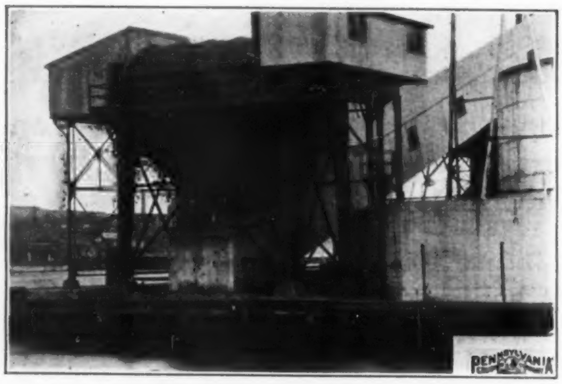
BOOTHS 286-7—NEW YORK POWER SHOW—DEC. 5 to 10

"PENNSYLVANIA"

THE CHOICE OF LEADING ENGINEERS

IN SPECIFYING COAL PREPARATION MACHINERY FOR CENTRAL STATIONS, GAS WORKS AND INDUSTRIAL POWER PLANTS



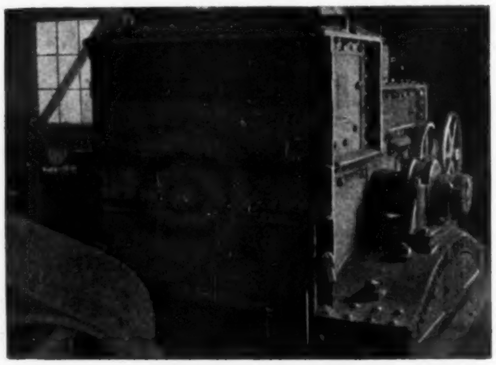
"Pennsylvania" Coal Breaker and Cleaner, crushing, sizing and cleaning the entire tonnage for Narragansett Station

The rapidly increasing number of these installations are giving substantial recognition to the imperative importance of Coal Preparation Machinery which, with tireless dependability, will prepare an unfailing supply of accurately sized and cleaned coal for Pulverizers and Stokers.

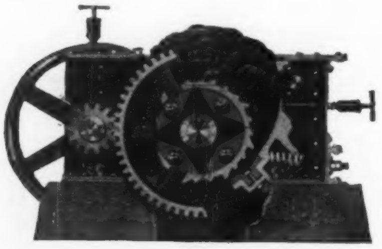
AT THE NEW YORK POWER SHOW—

we will present a new Series of "Pennsylvania" Coal Preparation Mills for smaller Central Stations and Industrial Power Plants in Booths 286-7, on the mezzanine floor.

We will also show in operation a model of the "Pennsylvania" Coal Breaker and Cleaner, and other exhibits of timely interest to engineers responsible for power generation.



"Pennsylvania" STEELBUILT Hammermill for preparing coal for pulverizing and gas making



"Pennsylvania" STEELBUILT ARMOR-FRAME Single Roll Crusher for Industrial Power Plants and Gas Works

Three distinct "Pennsylvania" types have been specialized to meet the requirements of large, medium and small plants.

More than a tenth of the annual Bituminous output of U. S. mines is "Pennsylvania" prepared for Steam, Gas and Coke making.

Our engineers, widely experienced in Coal Preparation Problems, are at your service in the selection and application of equipment which your particular requirements indicate.

PUT YOUR COAL PREPARATION PROBLEMS UP TO US

PENNSYLVANIA CRUSHER COMPANY

GENERAL OFFICES
LIBERTY TRUST BUILDING, PHILADELPHIA

NEW YORK PITTSBURGH CHICAGO LOS ANGELES LONDON

STEELBUILT CRUSHERS

Sixth National Exposition of Power and Mechanical Engineering
DIRECTORY of EXHIBITORS

Booths No. 2 to 101—Main Floor—*Diagram on Page 35*
Booths No. 201 to 347—Second Floor—*Diagram on Page 37*
Booths No. 401 to 569—Third Floor—*Diagram on Page 39*
Booths No. 600 to 773—Fourth Floor—*Diagram on Page 41*

Corrected to November 19th **Booth**

Absolute Con-Tac-Tor Corp'n..........737-738
Elkhart, Ind.
Exhibiting automatic electric controls for oil burners, coal burners, gas burners, refrigerators, unit heaters, etc. including safety devices, magnetic valves, room temperature controls, boiler controls, commercial and domestic refrigerator thermostats and pressure cutouts.

Accurate Brass Casting Co., Inc............502
325 Cooper St., Brooklyn, N. Y.
Exhibit will consist of several hundred assorted designs of Brass and Copper Forgings and Brass and Bronze Castings, covering a range of parts to which these processes lend themselves.

Acetylene Journal.........................441
Chicago, Ill.

Acorn Manufacturing Co...................768
Lynbrook, L. I., N. Y.
Exhibiting Signaling, Communicating, Lighting and Control Equipment.

Advance Engrg. Co......................274-276
168 Washington St., New York, N. Y.
Exhibiting Cash Standard Reducing and Regulating Valves. Mosher Steam and Oil Separators. Cadman Blow-Off and Gate Valves. Chicago-Wilcox Gaskets. Will also show working models of Armstrong Steam Trap, Templeton Brothers Boiler Feed Return and Pumping Traps and Cast Compressed Air Separators.

Aerofin Corp'n...........................14A
Newark, N. J.
Manufacturers of Aerofin Coils for Hot Blast Heating.

Air Preheater Corp'n...............234, 235
25 Broadway, New York, N. Y.
...................See Adv. Page 10
Will exhibit a Scene-in-action photograph of the Ljungstrom Air Preheater, together with modern models of the complete boiler plant with the Ljungstrom Air Preheater adapted to the boiler. A great many photographs of installations will be shown.

Albaugh-Dover Mfg. Co.....................674
2100 Marshall Blvd., Chicago, Ill.
...................See Adv. Page 115
Will exhibit a full line of anti-friction bearing Spur and Worm Gear Reducing Units. Will have one 800,000 to 1 ratio Spur Gear Reducer in operation the same being fully equipped with anti-friction bearing and driven by a 1/4 H. P. full ball bearing motor. Will show various samples of different types of gearing.

Alexander Bros............................625
14 South St., Philadelphia, Pa.
...................See Adv. Page 104
Exhibit will consist of Tentacular Transmission Belt showing this belt in actual operation on certain type of machine.

Allen, A., & Sons.....................485-486
Harrison, N. J.
Will exhibit ALLAN RED METAL; segments for facing pistons of Diesel, Corliss and Uni-flow engines and air compressors; bushing, cored and solid; globe valve discs, high pressure and high temperature service; and locomotive piston rod and valve stem packing rings for superheat service.

Allen-Sherman-Hoff Co.....................75
261 S. 15th St., Philadelphia, Pa.
...................See Adv. Page 122
Will have two Scene-in-action pictures displaying the method of operation of Hydrojet System. Briefly, will show a section through a pulverized fuel fired furnace, through water walls, ash hoppers with gates beneath showing the ashes; the Hydrojet System beneath moving the ashes out of the picture. The second picture will show these same ashes entering a sump, being pumped with a Manganese steel pump into a Cast Iron Storage Bunker, and trucks will appear. The gate controlling the cast iron bunker will open, the truck will be loaded and the entire operation repeated. Literature descriptive of our equipment will be available at the booth.

Allis-Chalmers Mfg. Co.............516-518
Milwaukee, Wis.
...................See Adv. Page 116
Manufacturers of Power, Electrical and Industrial Machinery, Hydraulic Turbines, for all sizes and heads, Pumping Engines, Centrifugal and Plunger Pumping Units, and Texrope Drives.

American AbrasiveMetals Co...........730, 731
50 Church St., New York, N. Y.
Will exhibit Feralun, Bronzalun and Alumalun anti-slip walkway surface materials for safety stair treads and platforms, floor plates, elevator thresholds, etc. Engineers at the booth will give information as to how these products may be most economically and effectively applied.

American Air-Cooled Block-Arch Combustion Co..............................567
420 Lexington Ave., New York, N. Y.
Will exhibit flat suspended Air-Cooled Block-Arch designed for delivering preheated air to boiler furnaces and thereby bringing about higher furnace efficiency.

American Arch Co. (Inc.)..................58
17 East 42nd St., New York, N. Y.
Exhibit will include full size models of the American Suspended Arch and Arch Lock Brick and Tile, also Air Cooled Side Walls.

American Blower Co.................. 319-322
6004 Russell St., Detroit, Mich.
Will exhibit working models of three Sirocco Flue Dust Collectors and an A. B. C. Air Filter. The Air Filter will be located last so that any dust which may escape from the collectors will have to pass through the air filter.

American Brass Co.........................65
Waterbury, Conn.
The Exhibit includes Condenser Tubes of both Admiralty and Muntz Metal; Turbine Blading made of Nickel Bronze, Manganese Copper, Cupro Nickel and Monel Metal; Copper Bus Bars and Tubes; Commutator Bars and Segments; Tobin Bronze Turned Piston Rods and Shafting; Bare, Insulated and Weather-proof Wire; Lead Sheathed Power Transmission Cable, Paper or Varnished Cambric Insulated.

American Car & Foundry Co...............201
30 Church St., New York, N. Y.
Will exhibit No. 3-3 Electrode Berwick Electric Rivet Heater, for heating rivets; No. 3-1-Electrode Type "E" Berwick Electric Heater for heating for forging and for upsetting work; Bar Heater which is a miniature of our 20' Bar Heater.

American Engineering Co..................298
Cumberland & Aramingo Sts., Phila., Pa.
Manufacturers of Underfeed Stokers, Boiler Furnaces, Coal and Ash Hoppers, Hoisting and Steering Engines, Hoists, Winches, Capstans, Windlasses, Steering Machines, and Towing Machines.

American Foundry Equipment Co...........448
Mishawaka, Ind.
Manufacturers of Foundry Equipment.

American Machine & Foundry Co......423-8
5520 Second Ave., Brooklyn, N. Y.
...................See Adv. Page 63
Exhibiting four different types of Automatic Weighing Machines. The automatic Sacking Scale No. 515-A is particularly adapted for packing such free flowing materials as fertilizer, acid, phosphate, etc. and will work equally well on non-free flowing materials by the addition of an agitator. Another type-Automatic Continuous Stream Scale No. 200 has a double unit weighing feature and is used extensively where commodities are to be weighed into containers of from 1-2 to 48 ounce capacity. The Gravity Feed Weighing Machine Cooper type can be used with free flowing materials which are to be packed in containers or sacks of from one to 25 lbs., and will weigh from 8 to 25 per minute. For those of a profession particularly interested in the latest engine developments, there will be exhibited the Bronander Engine, which is suitable in sizes from 50 to 450 H. P., as a full Diesel Engine and in sizes from 30 to 250 H. P., as a Gas Engine.

American Pipe Bending Machine Co.....770, 771
37 Pearl St., Boston, Mass.
Will exhibit and demonstrate by actual bending Type E 4" power bender, Type A 2", Type G 1 1/4" and Type S 1" machines, hand operated.

American Pulley Co.......................690
4200 Wissahickon Ave., Phila., Pa.
Manufacturers of Pulleys, Shaft Hangers, Hand Trucks, Hand Car Wheels, Pressed Steel Shapes, and Sheet Metal Stampings.

American Schaeffer & Budenberg Corp'n......74
Berry & South Fifth Sts., Brooklyn, N. Y.
Will exhibit line of American Industrial Instruments for indicating, recording and controlling temperatures, pressures and speeds including Pressure Gauges, Pop Safety and Relief Valves, Steam Traps, Indicating Thermometers, Dial Thermometers, Recording Thermometers, Tachometers, Recording Gauges, Electric Temperature Controller, Temperature Controller, etc.

American Society of Heating & Ventilating Engrs..................573
29 West 39th St., New York, N. Y.
Facilities will be provided for welcoming Society members and furnishing all information concerning Society activities. The Research Laboratory will erect a suitable apparatus for determining the amount of air infiltration occurring through windows of the Grand Central Palace Building.

American Society of Mechanical Engineers....80
29 West 39th St., New York, N. Y.
A.S.M.E. Headquarters at the Power Show. Information may be had about Annual Meeting and other A.S.M.E. Activities. Publications of the Society will be on exhibition.

American Steam Packing Co................666
Needham Heights, Mass.
Manufacturers of Asbestos and Fibre Packing.

American Water Softener Co...............461
Lehigh Ave. & 4th St., Phila., Pa.
Will exhibit wash drawings of continuous water softener types. Also, descriptions of operation of these machines. Also, photographs of installations of various kinds and bulletins and literature covering water softeners and filters.

American Well Works, The................662
Aurora, Ill.
Will exhibit latest type of totally enclosed self-lubricating deep well power pump head, also type U horizontal motor driven centrifugal pump, and type Q vertical centrifugal Sump pump, for pumping water, sewage; etc. Also working model of totally enclosed self-lubricating deep well power pump head in operation.

American Wool & Cotton Reporter..........3F
530 Atlantic Ave., Boston, Mass.
Current issues of the publication and data concerning markets will be on exhibition.

Ames, B. C., Company.....................646
Waltham, Mass.
Manufacturers of Drilling Machines, Filing Machines, Milling Machines, Tapping Machines, and Bench Lathes.

Anaconda Copper Mining Co.................65
25 Broadway, New York, N. Y.
Exhibiting the complete Anaconda line of Sheets, Wire, Rods and Tubes—interesting sections devoted to Die Pressed Parts, Extruded Sections, Welding Rods and Everdur.

Andale Engineering Co....................324
1600 Arch St., Philadelphia, Pa.
Will exhibit an oil cooler, in which both the water and the oil pipe connections are fixed and are not disturbed when removing the tube bundle for cleaning. Engineers at the Booth will be glad to give information on this and other Andale products.

Andrews-Bradshaw Co.......................17
530 Fourth Ave., Pittsburgh, Pa.
Will exhibit Tracyfiers at work under conditions that resemble those found in actual boiler operation as closely as possible. Also Tracyfiers of the latest construction shown complete, and also disassembled.

Arca Regulators (Inc.)....................233
11 Park Pl., New York, N. Y.
American manufacturers of specialized controls for high and low pressure, temperature, humidity, density, speed, combustion and level. Demonstrating apparatus on display to show construction and closeness of regulation.

Armstrong Cork & Insulation Co.......215, 216
122—24th St., Pittsburgh, Pa.
Manufacturers of Cork Blocks, Cork Board, Cork Brick, Insulating Cements, Boiler Setting Coverings, Pipe Coverings, Cork Gaskets, and Cork Tile.

Armstrong Machine Works.................275
316 Maple St., Three Rivers, Mich.
Will exhibit complete line of Armstrong Traps, including steel traps for high pressure service. A glass model of Armstrong Steam Trap operating on steam pressure will be used to show the functioning of the Armstrong Trap.

Ashton Valve Co...........................38
161 First St., Cambridge 41, Boston, Mass.
Exhibiting Ashton Pop Safety and Relief Valves, Pressure and Vacuum Gages. Featuring Ashton 40" No. 100A Master Pilot Pressure Gage with double illuminated dials; styles C. S. H. high pressure pop safety valve; Deadweight Gage Testers with double area feature.

Atkins, E. C., & Co.......................631
Indianapolis, Ind.
Will have metal cutting machines in oper-

Continued on Page 11

Advertisements of firms listed in color appear on pages indicated

Sixth National Exposition of Power and Mechanical Engineering

DIRECTORY of EXHIBITORS

Booths No. 2 to 101—Main Floor—*Diagram on Page 35*
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Booths No. 401 to 569—Third Floor—*Diagram on Page 39*
Booths No. 600 to 773—Fourth Floor—*Diagram on Page 41*

Booth

ation. In addition, will display an assortment of saws and other tools. Also demonstrating Atkins SILVER-STEEL Hand and Power, Genuine High Speed Steel Hacksaw Blades.

Atlantic Gear Works......626
16 Jefferson St., Brooklyn, N. Y.
The feature of this exhibit will be a 30" Schuchardt & Schutte Gear Hobbing Machine and a Special Worm Miller, both in actual operation. It will also include gears of various types, speed reducers, Precision Measuring Instruments, Tachometers, and Speed Indicators.

Atlas Valve Co.......612
282 South St., Newark, N. J.
Will feature the CAMPBELL Boiler Feed Water Regulator. Other popular products will also be exhibited, namely: Reducing Valves, Damper Regulators, Temperature Regulators, Pump Governors, Float Valves, Swing Joint Fittings, Thermostats and Balanced Valves.

Atwood & Morrill Co.......552, 553
Salem, Mass.
Exhibiting turbine and condenser valves of different types, such as reverse flow valves, float chambers, condensate traps, by-pass valves and also adjustable type combination regulator. Also exhibit reducing valves and strainers used in connection with the above.

Automatic Weighing Mch. Co.......424
Newark, N. J.
Manufacturers of Weighing Machines.

Babbitt Steam Specialty Co.......90
New Bedford, Mass.
Manufacturers of Rust Removing Compounds, and Chain Valve Wheels.

Babcock & Wilcox Mfg. Co.......55
85 Liberty St., New York, N. Y.
Exhibit will include sections of forged steel headers; forged steel drum nozzles; sections of forged steel superheater boxes; drum rivets; high pressure gauge glasses and other fittings. In addition, a B. & W. mechanical atomizing oil burner fitted with B. & W. No. 80 high grade furnace brick, and special shapes of this brick. Also Enduro and Toncan Iron superheater and economizer tubes.

Badger, E. B., & Sons Co......436
75 Pitt St., Boston, Mass.
See Adv. Page 38
Will exhibit line of Expansion Joints consisting of the Badger Self-Equalizing Expansion Joint in both the flanged and welding type, also fitted with monel metal sleeves for superheat, and the Badger Low Pressure, both single and Multiple Corrugation Joints, to care for a small amount of expansion and vibration.

Bailey Meter Co......51
East 46th at Euclid, Cleveland, Ohio
See Adv. Pages 44, 45
Will display a number of different styles and sizes of meter panel boards, as well as a complete line of Bailey Boiler Meters, Electrically and Mechanically Operated Fluid Meters, Pressure and Temperature Recorders, Tachometersand Multi-Pointer Gages. Bailey Meter Control for automatically regulating the supply of fuel and air to the boilers in a power plant in accordance with the demand for steam, and in the proper proportions to give best combustion efficiency, will be in operation.

Baldwin Chain & Mfg. Co.......750
199 Chandler St., Worcester, Mass.
Manufacturers of Power Transmitting Chains and Sprockets.

Ballwood Company......346
30 Church St., New York, N. Y.
Manufacturers of Forged Steel Flanges, Welded Headers, Flanged Pipe Joints, Rolled and Welded Pipe, Pipe Bends, and Power, Industrial and Process Piping.

Barco Manufacturing Co......258
1801 Winnemac Ave., Chicago, Ill.
See Adv. Page 121
Exhibiting Barco Flexible Joints and Barco Lubricated Plug Valves, both of which are suitable for all pressures and vacuum, and are made of materials best suited for the fluids with which they are to be used.

Barnes & Jones......312, 313
128 Brookside Ave., Jamaica Plains, Mass.
Will exhibit appliances used in the installation of Vapor and Vacuum Steam Heating Systems, including Thermostatic Steam Traps for radiators, Modulation Valves, Thermostatic Drip Traps, Blast Traps, Boiler Return Traps, Vent Traps, etc.

Barrett Machine Co.......274
Pittsburgh, Pa.

Bartlett-Hayward Co......529
Baltimore, Md.
See Adv. Page 86
In this exhibit will be shown sectionalized mounted models and photographs of various types of Fasts' Flexible Couplings. Particular attention will be called to the design of this all-metal double engagement, positively lubricated flexible coupling which takes care of misalignment and allows free end float without making use of any flexible materials.

Bayer Company......347
4067 Park Ave., St. Louis, Mo.
Will exhibit three different models of Bayer Mechanical soot blowers known as the Bayer Master-Model "K-2" Balanced Valve-in-Head soot blower, Model "O" and Model "R." Will also exhibit our latest development in high temperature soot blower elements.

Bearings Industry Corp'n......482
1835 Broadway, New York, N. Y.
Will exhibit Ball Bearings, Roller Bearings, Both Taper and Cylindrical, Steel Balls. These bearings are interchangeable in sizes with others and are for use in general automotive and industrial work.

Bearium Bearings (Inc.)......524
261 Franklin St., Boston, Mass.
See Adv. Page 89
A complete exhibit of a new line of accurately sized, finished rods from $1/4$" to 1" in diameter (full length). Examples of large liner-type bearings, roll-necks, Diesel Engine, Aeroplane, machine tool, and fractional horsepower motor bearings. Also, a continuous demonstration of the non-seizing and non-scoring properties of Bearium Bronze by running a bushing to a red heat, on a cold rolled steel shaft, and applying water and oil without damage to bearing or shaft.

Beaumont, R. H., Co.......50
315 Arch St., Philadelphia, Pa.
Exhibiting working model of super-central system of coal and ash handling. Briefly, it consists of a counterweighted coal Skip Hoist, Tram Car, suspension bunker, weigh larry, pivoted ash gates and Cable Drag Scraper.

Belfield, H., Co.......673
435 N. Broad St., Philadelphia, Pa.
Exhibiting brass Expansion Joints; Iron Expansion Joints; Brass Fittings, Screwed Brass Fittings, Flanged; Hydraulic Bronze Valves; Extra Grade Brass Cocks; Swing Joints and Water Gauges; Copper Fittings Also showing Gland Packed All Iron Cocks.

Bentz Engineering Corp'n......492
661 Freylinghuysen Ave., Newark, N. J.
Manufacturers of Air Conditioning, Cooling, and Drying Apparatus.

Bernitz Furnace Appliance Co......78
80 Federal St., Boston, Mass.
See Adv. Page 114
Exhibiting the Bernitz Carborundum Water Wall Blocks (Thayer-type Patents applied for). By covering water wall tubes on the fire face with these blocks the resulting construction offers a wall, (1) that supports combustion right up to the face of the walls, (2) that aids to maintain high furnace temperatures at all ratings, (3) that resists both flame and mechanical abrasion. A complete section of a typical water wall equipped with these Bernitz Carborundum Blocks will be on exhibit. Will also have on exhibit the standard Bernitz Ventilated Types of Construction, featuring the well known Bernitz Carborundum "S-100" Boiler Furnace Blocks that have proven their worth in hundreds of power plants. New Descriptive literature will be ready for distribution.

Bethlehem Steel Co......70, 71
Bethlehem, Pa.
See Adv. Pages 82, 83
The main features of exhibit will be a full size No. 2 Bethlehem Pulverizer in operation, a Bethlehem Diesel Engine, and a demonstration model of the new Bethlehem Torque Amplifier and Back Lash Eliminator, which is used for securing an amplification of power with absolute synchronism. As other features expect to exhibit some of power plant auxiliaries such as the Bethlehem Dahl Oil Burning System with the Bethlehem Weir Type Boiler Feed Pumps as well as some samples of our Charcoal Iron Boiler Tubes.

Biax Flexible Shaft Co.......474
136 Liberty St., New York, N. Y.
Exhibiting Grinding Machines of $1/4$, $1/2$, $2^1/_2$ and 5 HP.; Boiler Cleaning Machines; Disc Sanding Machines; Rotary Machines; Scratch Finishing Machines; Rubbing Down and Polishing Machines; and Buffing Machines.

Bigelow Company......68
76 River St., New Haven, Conn.
See Adv. Page 34
Showing drawings and pictures of various boilers, featuring particularly the Bigelow-Hornsby Water Tube Boiler with and without integral steel economizer, and also with a combination slag screen and water cooled bridge wall. Will also have a working model of the Bigelow-Hornsby Boiler.

Biglow, L. C., & Co. (Inc.)......251
250 West 54th St., New York, N. Y.
Representing: Wm. Ganschow Co. and Whitney Mfg. Co.

Blaw-Knox Co.......618
Pittsburgh, Pa.
Will exhibit Blaw-Knox Security Electro-Forged Steel Grating and Open Flooring, and the Blaw-Knox Continuous Regenerative Air Heater, models of Clamshell Buckets and other products for the Power Plant.

Boig & Hill......10
180 Washington St., New York, N. Y.
Representing: Julian d'Este Company.

Boiler Engineering Co.......450
931 Federal Trust Bldg., Newark, N. J.
Will exhibit section of BECO Boiler Baffle Wall having positive expansion joints. No tiling. Not monolithic. No possibility that the wall will crack due to expansion or contraction.

Bond Foundry & Mach. Co.......611
Manheim, Lancaster County, Pa.
From the exhibit it will be noticed that the subject of Truck Casters has been treated from an engineering standpoint. There is exhibited a Caster for every conceivable purpose in the Industrial Plant, from the lightest load to the very heaviest.

Bordon Company, The......459
350 Dana Ave., Warren, Ohio
Will exhibit complete line of Easy Working Die Stocks of the receding type, also Square End Pipe Cutters and portable power drive for use in connection with hand tools.

Boston Gear Works Sales Co...213–214, 340–342
Norfolk Downs, Mass.
Exhibiting the following products. Standardized Speed Reducers, Helical and Worm Gear types. Standardized Gears including Hardened and Ground Spur Gears. Renold-Boston Silent and Roller Chain Drives.

Botfield Refractories Co.......325
Swanson & Clymer Sts., Philadelphia, Pa.
Will exhibit the new ADAMANT Gun in operation, applying refractory coatings (composed of ADAMANT Fire Brick Cement and ADACHROME, a chemically-neutral and highly refractory material, on a furnace wall.

Bowser, S. F., & Co.......739
Fort Wayne, Ind.
Displaying filtration equipment for turbines and other prime movers, featuring Bowser Type B No. 1 Filter; Bowser Model "W" Grease Lubricator; Storage and dispensing equipment for Lubricating oil and Xacto Meter.

Bradley Washfountain Co.......247
2203 Sycamore St., Milwaukee, Wis.
Manufacturers of Wash Fountains.

Bristol Company, The......12
Waterbury, Conn.
Exhibit will include complete line of Recording and Indicating Pressure and Vacuum Gauges; Recording Thermometers for Feed Water Economizer and Flue Gas Temperatures; Recording Voltmeters and Ammeters; Recording Tachometers; Tyrometers; Liquid Level Gauges.

Brooklyn Boro Gas Co.......614
Coney Island, N. Y.
Exhibiting Industrial Gas Appliances.

Brooklyn Union Gas Co.......615
176 Remsen St., Brooklyn, N. Y.
Exhibiting Industrial Gas Appliances.

Brown Instrument Co.......34
Wayne & Windrim Aves., Philadelphia, Pa.
There will be a display of giant reproductions of the Brown Electric Flow Meters. A large model of the circular-chart type of flow meter will be mechanically operated. Both indicating and recording models will be exhibited. These will be connected to Brown

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Advertisements of firms listed in color appear on pages indicated

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Booths No. 600 to 773—Fourth Floor—*Diagram on Page 41*

Booth

manometer which will be arranged so that it can be actuated by visitors. The balance of the display will consist of Brown Power Plant Efficiency Instruments. A special display of small instrument parts will be on hand also.

Buffalo Forge Company....................73
Broadway at Martime St., Buffalo, N. Y.
...............*See Adv. Pages 46, 47*

Exhibit will include various small fans used in the power plant and in the generation and regulation of heat and power, as well as some fans of larger construction used in power plants. Will also exhibit a Buffalo No. 0 Universal Iron Worker which is a popular maintenance tool.

Buffalo Steam Pump Co.....................73
490 Broadway, New York, N. Y.
Exhibiting Buffalo boiler feed pump, a new ball bearing pump, known as class "SW," a Buffalo Non-Clogging Sewage pump, and other equipment.

Builders Iron Foundry....................277
9 Codding St., Providence, R. I.
In addition to their well known Venturi Meter for the measurement of boiler feed supply and steam, will exhibit their new Shunt Steam Meters designed to economically measure the flow of steam in small pipe lines.

Builders Iron & Steel Co.....................468
25 Garvey St., Everett, Mass.
Manufacturers of Hand, Semi-Automatic and Automatic Stokers.

Bundy Steam Trap Co.....................8
39 Elm St., Nashua, N. H.
Will show complete line of Bundy Steam Traps, including the Return or Back-to-the-Boiler Trap, the Separating or Non-Return Trap, and Three Valve Vacuum and Pumping Trap. Some of these types will be operating under actual working conditions.

Burhorn, Edwin, Co...............A—Main Floor
25 West Broadway, New York, N. Y.
Will have model of the Burhorn "Smaltower" in operation showing the water distribution, air circulation and other details. Also photographs showing installations of cooling towers, cooling the water from jackets of Diesel engines, air compressors and for cooling the water from refrigerating apparatus.

Byers, A. M., Company....................443
235 Water St., Pittsburgh, Pa.
Will exhibit Vanstoned and welded joints, coils, and samples of an educational nature to show the process of manufacturing Byers Pipe. Will also have representative samples of our product showing the Spiral Stripe marking and method of rolling the name and year in each length.

Cameron, A. S., Steam Pump Works........554
11 Broadway, New York, N. Y.
...............*See Adv. Pages 70, 71*

(See Ingersoll-Rand Co.)

Campbell, Andrew C. (Inc.)....................660
Bridgeport, Conn.
Will exhibit No. 0, No. 1-A and No. 2 Campbell Nibbling Machines in operation. Sheet metals in thicknesses varying from 20 gauge to $^3/_8$ inch will be cut in intricate designs.

Carborundum Company....................22
Niagara Falls, N. Y.
Exhibit shows principally the application of Carborundum refractories to various designs of boiler settings, including air cooled walls, refractory protected water tube walls and solid walls. Will also display samples of the several grades of super refractories and high temperature cements.

Carr Fastener Co....................744
31 Ames St., Cambridge, Mass.
Showing Dot Lubrication Products, also demonstrating the Dot "Case-Study Method" by which Dot Engineers analyze the lubrication requirements of a particular plant and offer suitable devices and suggestions for lowering cost of production, prolonging life of equipment, reducing maintenance expenses and spoilage of work in process.

Carrick Engineering Co....................295
538 S. Clark St., Chicago, Ill.
Exhibit will cover a display of Carrick Control for the automatic regulation of combustion in boiler furnaces and will consist of the Carrick Master Control, both electrically and hydraulically operated.

Carrier Engineering Corp'n....................14A
750 Frelinghuysen Ave., Newark, N. J.
Manufacturers of Air Conditioning Apparatus and Systems, Cooling Systems, Dryers, Heat Exchangers, Humidifiers, and Dehumidifiers.

Casey-Hedges Co....................343
Chattanooga, Tenn.
...............*See Adv. Page 26*

Will have on exhibition a working Model of Multipass Boiler, a sample showing riveting through extra thick plates with extra large rivets; blueprints showing improved design of water walls applied to Boilers, and printed matter describing Boilers of various types.

Cash, A. W., Co.....................28
Decatur, Ill.
Manufacturers of Combustion Control Systems, Draft Control Systems, Strainers, Governors, Regulators, and Valves.

Celite Products Co....................14
1320 So. Hope St., Los Angeles, Cal.
...............*See Adv. Page 106*

Will have on display a giant Sil-O-Cel Insulating Brick and a number of charts and curves showing relative conductivities of common structural materials and typical boiler furnace wall constructions, a section of a boiler furnace wall showing the method of installing insulating brick between the refractory and the outer wall, a section of an insulated breaching showing the method of attaching insulation directly in contact with steel and a small demonstration furnace to show the relative amount of heat losses through insulated and uninsulated constructions.

Central Iron & Steel Co.....................745
Harrisburg, Pa.
Manufacturers of Treads and Floor Plates.

Centrifix Corp'n....................302, 303
3029 Prospect Ave., Cleveland, Ohio
Will have on display a complete line of separating and purifying equipment for steam, air, vapors, etc.

Century Electric Co.....................712, 713
1806 Pine St., St. Louis, Mo.
Exhibiting Single phase-Repulsion Start Induction Motors; Polyphase Squirrel Cage Induction Motors; Polyphase Automatic Start Induction Motors; Polyphase Double Squirrel Cage Induction Motors; Direct Current Fractional Horsepower Motors; and Portable Fans.

Chapman Valve Mfg. Co....................2
203 Hampshire St., Indian Orchard, Mass.
...............*See Adv. Pages 80, 81*

Exhibiting Chapman Chrome Nickel Steel Gate Valves for high pressure high temperature service and a working model of the Chapman motor unit showing the latest developments in that type.

Chicago Chemical Co.....................693
6216 W. 66th Place, Chicago, Ill.
Exhibit will demonstrate the value of K. W. S. sodium aluminate in the treatment of boiler feed both internally in the boiler and in connection with lime and soda ash softening plants.

Chicago Pump Co....................636–639
2336 Wolfram St., Chicago, Ill.
...............*See Adv. Page 108*

Exhibit will consist of the following: (1) "Flush Kleen" sewage ejector. Will show a large working model of the "Flush Kleen" sewage ejector which will display the cleaning of screens by flow reversal. (2) Condo-Vac pump. Will show our new condensation vacuum pump. (3) General line of pumps. Will display a general line of centrifugal pumps.

Chicago-Wilcox Mfg. Co.....................274
E. 77th St. & Anthony Ave., Chicago, Ill.
Manufacturers of Asbestos, Copper Asbestos, Fibre, Lead, Combustion, Rubber, Corrugated Steel, and Corrugated Copper Gaskets also Copper, Lead, Leather, and Rubber Washers.

Chisholm-Moore Mfg. Co.....................629
Cleveland, Ohio
Manufacturers of Hoists, Cranes, Cupola Chargers, etc.

Circular Heat (Inc.)....................209A
Louisville, Kentucky
Showing the new "Circular Heat Unit," a copper heater for homes, office buildings, etc., operating on the principle of convected air currents. The concealed and cabinet types will be exhibited.

Clarage Fan Company....................244, 245
Kalamazoo, Mich.
Will show a new Clarage humidifier and Clarage unit heater in operation. It is adapted for practically all types of humidifying and dehumidifying work. It is particularly practical for the small job.

Clements Mfg. Co.....................773
613 Fulton St., Chicago, Ill.
Will exhibit the CLEMENTS-Cadillac Portable Electric Blowers for cleaning motors, generators, switchboards, laundry machinery, woodworking machinery, textile machinery, etc., by blowing and suction.

Cleveland Worm & Gear Co.....................92
3249 E. 80th St., Cleveland, Ohio
Worm gear reduction units together with specimens of the internal parts entering into the construction.

Clipper Belt Lacer Co.....................551
974–1014 Front Ave., N. W., Grand Rapids, Mich.
Showing the entire Clipper line, including the new No. 8 Speed Lacer will be shown. Also showing the new Clipper electric display which is electrically and noiselessly operated.

Coal & Coal Trade Journal....................727
11 Broadway, New York, N. Y.
The news magazine of the coal world.

Cochrane Corp'n....................67
3130 N. 17th St., Philadelphia, Pa.
Exhibiting Cochrane Conical Strainless Filter, with Single Control and Constant Flow Valves; Cochrane Chemical Proportioner and Feeder; Pipe Flow Meters; Deaerating Heater with Vent Condenser; Steam and Oil Separators; Cochrane Traps and Drainers; and Cochrane Multiport Valve.

Coen Company (Inc.)....................15B
112 Market St., San Francisco, Cal.
Manufacturers of Oil Burners, Oil Heaters, Oil Strainers, Fuel Oil Pumping Outfits, and Steam Traps.

Coffin Valve Co.....................408, 409
Neponset, Mass.
Exhibiting a Kelty Motor Drive Unit operating 10" Chapman Gate Valve; a Dow Disc arm Pivot Valve with hydraulic cylinder and automatic solenoid operated control valve and a Hydraulic cylinder, equipped with a solenoid operated control valve for remote operation.

Combustion....................53
11 Broadway, New York, N. Y.
Showing copies of Combustion, and also a large number of books relating to combustion. These books are from various publishers, but include two books published by Combustion.

Combustion Engineering Corp'n....................24
200 Madison Ave., New York, N. Y.
...............*See Adv. Pages 74, 75*

Exhibiting two panels that are enlarged reproductions of tables which appeared in the 1927 Pulverized Fuel report of the Prime Movers Committee, N.E.L.A., showing all the power plants in the United States and Canada containing boilers of 500 h.p. and over, burning pulverized fuel with storage equipment. Check marks will indicate Lopulco equipment in these stations. A concealed projector will throw a moving line of type explaining what these displays represent. Other panels showing enlarged settings and plant layouts, and three Scene-In-Action displays will be shown. Important elements of the various stoker and pulverized fuel products which embody distinctive engineering features. will also be shown. Back of these elements will be enlarged photographs showing completely the products of which they are a part. The principal features of the equipment exhibit will be a Couch adjustable vane burner, and a small section of forged steel drum.

Combustion Sales Co. (Inc.)....................728
153 East 42nd St., New York, N. Y.
Exhibiting the C-E-Z Furnace Fire Observation Door.

Commercial Credit Corp'n....................243
100 E. 42nd St., New York, N. Y.

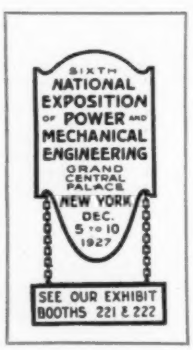
Compressed Spruce Products Co.....................695
82 Main St., West Orange, N. J.
Exhibit will consist of pulleys for all types of service, non-metallic gears and pinions, rolls, wheels, vibration and noise elimination blocks—all made from Compressed Spruce.

Condensed Catalogues of Mechanical Equipment....................80
29 West 39th Street, New York, N. Y.
Published annually by the American Society of Mechanical Engineers, 29 West 39th Street, New York, N. Y. The only specialized reference work for the buyer and specifier of mechanical equipment and engineering materials. Contains Mechanical

Continued on Page 15

Advertisements of firms listed in color appear on pages indicated

87 Years of Constant Progress



Each of these familiar trade marks indicates a distinct contribution by the Erie City Iron Works to the development of Power Plant and Pulverized Fuel apparatus.

Modern in every respect, suitable to the needs of the most up-to-date installations, they embody the results of three generations of constant progress in improving the efficiency of steam generation.

ERIE CITY IRON WORKS

ERIE, PENN'A, U.S.A.

Sixth National Exposition of Power and Mechanical Engineering
DIRECTORY *of* EXHIBITORS

Booths No. 2 to 101—Main Floor—*Diagram on Page 35*
Booths No. 201 to 347—Second Floor—*Diagram on Page 37*
Booths No. 401 to 569—Third Floor—*Diagram on Page 39*
Booths No. 600 to 733—Fourth Floor—*Diagram on Page 41*

Booth

Equipment Directory. Copies will be available for inspection.

Connery & Co. (Inc.)........................43
2nd St. above Erie Ave., Philadelphia, Pa.
Exhibit will consist of sections of breechings and air ducts constructed with Connery's Improved Expansion Stiffener and having incorporated in same Connery's Air Cooled Damper, Connery's Improved Expansion Stiffened Stack Connection and Connery's method of covering and covering attachment.

Consolidated-Ashcroft-Hancock Co...........60
100 East 42nd St., New York, N. Y.

Consolidated Gas Co. of N. Y...............613
130 East 15th St., New York, N. Y.
Will show sections of plants where gas fuel is used in industry. These exhibits, where possible, will be in operation.

Consulting Engineering Co.................665
Fulton Bldg., Pittsburgh, Pa.
Exhibiting Northwestern Electrically Operated Control Systems for pressure and combustion regulation. Used to regulate coal, gas and pulverized fuel fired boilers in all combinations; also, for controlling pressures of blast furnaces, by-product coke plants, illuminating gas plants, and annealing furnaces.

Continental Valve & Equip. Corp'n..........316
82 Herbert St., Framingham, Mass.
Exhibiting Framanco Governors, reducing valves, forged steel fittings screw end, forged steel flanged fittings, forged steel double tight joint unions, forged steel flanges, straight and reducing couplings straight and reducing bushings and hydraulic fittings.

Cook Elec. Co...........................710
2700 Southport St., Chicago, Ill.
Exhibiting Metal Bellows of Monel, Bronze, or Brass; Automatic Fuel Oil Pumps for Oil Burners; Regulating devices for oil burners; Anti-Syphon Valves and Gauges for fuel oil; Low pressure Gauges; Air Regulating Valves; Furnace Damper Regulators; Automatic Steam Valves; Steam Traps; Flexible Couplings; Heat Motors; and Heat Coil Protectors.

Cooper Hewitt Elec. Co. (Inc.)..............504
95 River St., Hoboken, N. J.
Exhibit will consist of an operating exhibit of mercury vapor lighting. This type of lighting has found very general application in the industrial field, and is of particular interest to the manufacturing and production executives. Also showing an operating exhibit of Cooper Hewitt Kon-nec-tors.

Cork Foundation Co..................760, 761
315 Fifth Ave., New York, N. Y.
Showing various methods of installing ABSORBO cork foundation mats to absorb vibration and noise.

Cory, Chas., & Sons (Inc.).............241, 242
183–187 Varick St., New York, N. Y.
Exhibiting Signaling, Communicating, Lighting and Control Equipment. Featuring Cory-Robinson Interlock; Cory Seamless Flexible Metal Hose; Cory Signal Systems; and Anti-noise telephones.

Crandall Packing Co.......................755
Palmyra, N. Y.
Will exhibit raw materials entering into the manufacture of packings. This will be supplemented by a display of finished products of a full line of mechanical packings.

Crane Company...................52, 462–464
836 S. Michigan Ave., Chicago, Ill.
Exhibiting valves and fittings of Forged Steel, Cast Steel, Ferrosteel, Cast Iron and Bronze to meet the piping requirements of all modern industrial power plants and central stations. Exhibit features a large size high pressure steel valve in section.

Crankless Engines (Ltd.) (Melbourne)..758, 759
Melbourne, Australia
Manufacturers of Oil and Gasoline Engines, Blowers, Air Compressors and Pumps.

Crosby Steam Gage & Valve Co..............98
40 Central St., Boston, Mass.
Will exhibit new nozzle type safety valve for pressures up to 1500 lb. per sq. in. Also a new reseating tool which permits the reseating of safety valves in position on the boiler. Also a gage board.

Crouse-Hinds Company...................610
Syracuse, N. Y.
Exhibit will consist of Condulets, Panelboards, Floodlights and a complete line of Groundulets.

Crowe Mfg. Corp'n.........................473
225 E. 3rd St., Cincinnati, Ohio
Manufacturers of Circular Band Saw Woodworking Machinery.

Booth

Cutler-Hammer Mfg. Co...............454, 455
Milwaukee, Wis.
Exhibiting C-H "Across-the-Line" "X" automatic starters for alternating current motors; also motor operated unit for controlling steam, water or gas valves, electrically. Will also show electric space heaters and electrical tubular unit heaters.

Cutter Electrical & Mfg. Co.................14B
501 N. 19th St., Philadelphia, Pa.
Will show a 40,000 ampere, single pole, non-closable on overload, solenoid operated air carbon Circuit Breaker. Also showing the following carbon Circuit Breakers: 1000 Ampere, 3 pole, 440 volt A.C., 60 Cycle; 400 ampere.

Dampney Company of America.............248
Hyde Park, Boston, Mass.
Will exhibit complete line of APEXIOR Protective Coatings for metal surfaces and show the simple equipment that has been developed for applying it expeditiously to the internal surfaces of boiler and economizer tubes, etc.

Davidson, M. T., Co.....................36, 37
154 Nassau St., New York, N. Y.
Models and actual pumps of different types will be shown. The "Davidson" line includes all types of direct acting steam pumps of the simplex type, the advantages of which are shown by demonstration.

Davis Engineering Corp'n..............415, 416
90 West St., New York, N. Y.
Exhibiting the following Paracoil products; Closed type feed water heaters, Evaporators, Distillers, Lubricating oil coolers, Feed water filters and grease extractors, Storage type water heaters, Instantaneous type water heaters, Domestic water heaters, and Steam Traps.

Davis, G. M., Regulator Co.................267
422 Milwaukee Ave., Chicago, Ill.
Exhibiting Pressure Regulators, Balanced Valve, Float Valves, Fluid Control Valves, Back Pressure Valves, Exhaust Relief Valves, Water Relief Valves, Strainers, Bleeder Valves, Steam Traps, Pump Governors, Emergency Stop Valves, Flow Regulators, Non-Return Valves, Fluid Level Controllers, Float Box, Stop and Check Valves, and Cushioned Check Valves.

Dean, Payne (Ltd.).........................16
402 Madison Ave., New York, N. Y.
Exhibiting Dean Valves and Valve control.

Dearborn Chemical Co.......................13
310 S. Michigan Ave., Chicago, Ill.
See Adv. Page 88

Information may be obtained about water treating preparations (boiler feed water treatment), No-Ox-Id, Rust Preventive, Lubricating Oils and Greases. Samples of their products will be on display, and also interesting exhibits to show results that can be obtained from the use of them.

De Bothezat Impeller Co..................769
1922 Park Ave., New York, N. Y.
Exhibiting various types of disc pressure fans. Possibility of obtaining high static pressure with very high efficiency with the disc fan of Doctor G. de Bothezat special design. Experimental demonstration of high static pressure furnished by the De Bothezat Disc Pressure Fan.

De La Vergne Machine Co..................760
Foot East 138th St., New York, N. Y.
Exhibiting a small size double cylinder vertical single acting enclosed crank case type ammonia compressor, arranged for belt drive and mounted on an Absorbo cork foundation mat.

De Laval Separator Co................536–539
165 Broadway, New York, N. Y.
Will exhibit centrifugal purifiers for removing water and solid matter from oil, and for clarifying various other liquids.

De Laval Steam Turbine Co..............540–543
Trenton, N. J.
See Adv. Page 12

A leading feature of the exhibit will be a centrifugal pump which has been specially developed for feeding modern high pressure boilers. To reduce the leakage between stages with pumps having split diaphragms, the diaphragms of this pump are built in one piece and make metal to metal joints. The rotative and peripheral speeds and the pressure per stage are conservative, as has been found best for handling hot water. Will also exhibit a steam turbine of the velocity stage type and parts of steam turbines of the pressure stage type; also, a centrifugal compressor for air or other gases, and worm reduction gears of various types, including single and double reductions for driving horizontal shafts, and single reduction for driving vertical shafts. Also, flexible couplings for connecting the shafts of driving and driven machines of various types.

Booth

d'Este, Julian, Co.........................10
26 Canal St., Boston, Mass.
See Adv. Page 32

Will show complete line of CURTIS Engineering Specialties which will comprise: Pressure Reducing Valves for Steam, Water, Air Damper Regulators, both steam and hydraulic operation. Steam Traps. Temperature Regulators for hot water tanks. Float Valves for hot and cold water. Water Pressure Regulators, both hot and cold water. Pump pressure regulators, etc.

Detrick, M. H., Co.........................94
140 S. Dearborn St., Chicago, Ill.
Exhibiting full sized model of the Detrick Sectionally Supported refractory wall. Also small models of Detrick Wall and Arch showing the details of the design together with a number of large line drawings of interesting installations we have made.

Detroit Stoker Co....................203–205
General Motors Bldg., Detroit, Mich.
See Adv. Pages 48, 49

Will exhibit full size working models of Detroit Double Retort, Single Retort and Multiple Retort Underfeed Stokers. Demonstrations will be made of the method of independent and individual control of the distribution of fuel in each retort.

DeWalt Products, N. Y., (Inc.)..............686
1521 Cortelyou Rd., Brooklyn, N. Y.
Will display two of the DeWalt Woodworkers.

DeWaters Safety Latch Co..................263
110 West 40th St., New York, N. Y.
Exhibiting automatic positive locking furnace door latches designed for various types of doors. Models mounted on actual firing doors and so arranged and adjusted that the unfailing catching and holding quality of the Latch can be demonstrated.

Diamond Power Specialty Corp'n...........16
10340 Oakland Ave., Detroit, Mich.
See Adv. Pages 54, 55

Manufacturers of Soot Blowers.

Dickson, Walter S., & Co..............232, 233
11 Park Pl., New York, N. Y.
Arca Regulars (pressure, temperature, humidity, density, vacuum, speed, etc.) Eclipse Valves (stop, check, pressure reducing, back pressure, relief, balanced, etc.) Eclipse Steam Traps. Mac-N Beam Clamps and Pipe Hangers.

Dixon, Jos., Crucible Co...................254
Wayne & Monmouth Sts., Jersey City, N. J.
See Adv. Page 84

Will exhibit Dixon's Flake Graphite, Graphite Greases, Silica-Graphite Paint, Aluminum-Graphite paint and other graphite products.

Dodge, F. W., Corp'n.......................27
119 W. 40th St., New York, N. Y.
Publishers of Sweets' Engineering and Architectural Catalogues.

Dodge Mfg. Co...............465, 466, 469, 470
Mishawaka, Ind.
Manufacturers of Power Transmission Equipment—Bearings, Bushings, Friction Clutches, Shaft Collars, Countershafts, Shaft Couplings, Fly Wheels, Shaft Hangers, Gears, Pillow Blocks, Pulleys, Shafting, Sheaves, Sprockets, etc. Also Oil Engines, Conveyors, and Special Machinery.

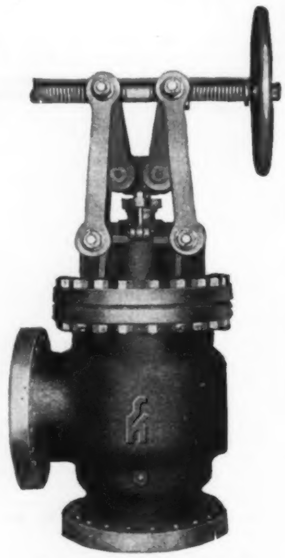
Domestic Stoker Co.......................249
7 Dey St., New York, N. Y.
Showing a live display of the Electric Furnace-Man stoker operating a low pressure steam boiler under actual fire conditions, showing the automatic coal-feed and ash removal features of the Electric Furnace Man.

Drake Non-Clinkering Furnace Block Co......227–228
5 Beekman St., New York, N. Y.
See Adv. Page 40

First public showing of the Drake SX air-cooled wall, a radical development in this type of equipment, also first showing of the Drake Power Burner for pulverized fuel. The Drake Armour Clad Water Walls together with the Standard Drake Blocks in various materials will be displayed.

Dri-Steam Valve Sales Corp'n..............607
565 Fifth Ave., New York, N. Y.
Will exhibit full size cut models of Dri-

Continued on Page 17



Toggle Stop Check Valve

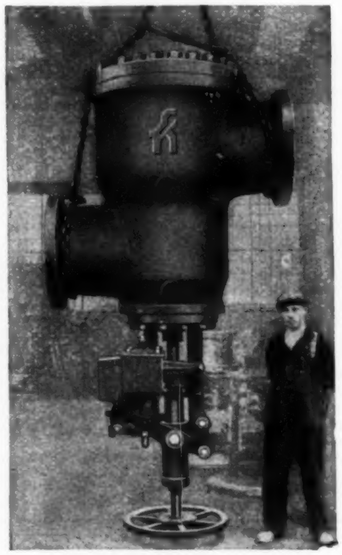
SCHUTTE VALVES

for steam, water, oil, air, gas and chemical lines.

Stop Valves
Check Valves
Lever Valves
Piston Valves
Reducing Valves
Stop Check Valves
Triple Duty Valves
Trip Throttle Valves
Bleeder Line Valves
Exhaust Line Valves

Bronze, iron and steel for pressures up to 1400 lbs.

Examine our Valve Catalog at the show



Offset Trip Throttle Valve

SCHUTTE KOERTING

Injector

KOERTING JETS

for pumping liquids, heating liquids and handling air or gases by live steam, pressure liquid or compressed air.

Syphon

Boiler Feed Injectors
Steam Jet Syphons Water Jet Eductors Air Jet Lifts
Noiseless, Continuous and Circulating Heaters
Steam Jet Blowers and Blast Nozzles Economy Blowguns
Obnoxious Vapor Condensers
Steam and Water Jet Exhausters and Compressors
Steam Jet Thermo-Compressors Spray Nozzles Desuperheaters

Blower

Use Jet Devices—they are simple but effective

Examine our Jet Catalog at the show.

Exhauster

SCHUTTE & KOERTING CO. 1166 Thompson St. Philadelphia, Pa.
See our adv. on page 37—Section One
(See Our Data in 1927-28 A.S.M.E. Condensed Catalogues of Mechanical Equipment)

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DIRECTORY of EXHIBITORS

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Booth

Steam Valves, in globe angle and non-return types, for all pressures, showing separating and steam drying device. Will show new graduating radiator inlet valves—packed and packless.

Dry Quench Equipment Co. 25
200 Madison Ave., New York, N. Y.

Dunham, C. A., Co. 701–702
450 East Ohio St., Chicago, Ill.
See Adv. Page 113

There will be exhibited working units of the DH series Pump, a D26 Dunham Differential Vacuum Pump, a Dunham Condensation Pump and Receiver. In addition to these working units there will be a display of Dunham Thermostatic Radiator Traps, Float and Thermostatic Traps, Return Traps, Air Eliminators, Packless Radiator Valves and Dunham Sub-atmospheric Pressure Reducing Valves, all shown in such a manner as to display interior mechanisms.

Dunham, Keith Co. 643–645
110 S. Dearborn St., Chicago, Ill.
Full details covering plant cost and production cost of oxygen, nitrogen, liquid oxygen, and liquid air will be available to interested executives and engineers.

Durabla Mfg. Co. 236
114 Liberty St., New York, N. Y.
Will exhibit DURABLA Metal Pump Valve Units, DURABLA Fibre Homogeneous Asbestos Sheet and Gaskets, DURABLA Semi-Metallic Rod Packing, DURABLA High Pressure Gauge Glasses and Gauge Glass Washers, DURABLA Discs.

Durametallic Corp'n 749
806 Cobb Ave., Kalamazoo, Mich.
Will exhibit the five Grades of Durametallic Rod Packing, emphasizing Grades designed for highest pressures and temperatures. Durametallic will be shown in the new Spiral style as well as the Bar form. Die molded ring sets will be featured.

Eastern Steam Spec. Co. 440
242 Lafayette St., New York, N. Y.
Manufacturers of Steam Specialties.

Economy Pumping Mach. Co. 471
3431 W. 48th Place, Chicago, Ill.
See Adv. Page 102

Exhibiting a number of new pump designs including a 6" double suction single stage 1400-GPM pump, $2^1/_2$" four stage heavy duty boiler feeder, 125 GPM sump pump, non-clogging sewage impeller, condensate and return line vacuum heating pumps.

Edge Moor Iron Co. 288–290
Edge Moor, Del.
See Adv. Page 30

The main feature of the exhibit will be a full sized hammer welded boiler drum, a new departure in American boiler practice, designed and built for high pressure service for the Edge Moor Single Pass Boilers to be installed in the plant of the Oklahoma Gas & Electric Company at Harrah, Okla. There will also be on hand full information together with drawings and photographs of recent installations of Edge Moor Longitudinal and Cross Drum Boilers, Edge Moor Single Pass Boilers, Edge Moor Waste Heat Boilers and Edge Moor Heating Boilers.

Edlund Machinery Co. 646
Cortland, N. Y.
Manufacturers of high speed ball bearing drill presses.

Edward Valve & Mfg. Co. 30
East Chicago, Ind.
See Adv. Pages 76, 77

The exhibit will show full line of forged steel valves in the latest developments for the higher pressures and temperatures. These developments include such features as the offset body and pillar type yoke construction. Other items of the Edward complete line will be illustrated in detail by means of a "Baloptican."

Electric Machinery Mfg. Co. 574
52 Vanderbilt Ave., New York, N. Y.
Exhibit has been specially designed and built to demonstrate the operation of frequency relays as applied to synchronous motors. It also shows a number of interesting synchronous motor characteristics and will give engineers an opportunity to learn many things about synchronous motors.

Elliott Company 271–273
Jeannette, Pa.
See Adv. Pages 72, 73

As was done last year, one item in the broad line of power plant equipment manufactured by Elliott will be featured and the rest of the line shown by means of numerous photographs and photographic enlargements. This year the exhibit will feature a new type of turbine driven centrifugal blower. The rest of the broad line of Elliott Power Plant Equipment covering steam turbines, engines, motors, condensers, ejectors, deaerators, feed water heaters, strainers, separators, valves, etc. will be shown by means of photographs and photographic enlargements.

Ellison, Lewis M. 44B
214 West Kinzie St., Chicago, Ill.
Will exhibit ELLISON Pointer Draft Gage—Straight line movement—and a new line of dial draft gages. Also inclined and vertical tube draft gages, stationary and portable. The new ELLISON U Path Steam Calorimeter—accuracy 2 degrees within theoretical temperature.

Engelhard, Chas. (Inc.) 675
30 Church St., New York, N. Y.
Exhibiting a recently perfected Stackmeter; Resistance Thermometers; Mercoid Thermostats; Pyrometer Instruments; Automatic Temperature Regulators; Pressure Controls, etc.

Engineer Company 18
17 Battery Place, New York, N. Y.
Will have models or actual equipment to show the following: Enco Combuston Control; Enco Burners; Enco Baffle Walls; and Enco Cross Baffles. A number of these products are being shown for the first time and will be of special interest.

Engineering Products Corporation 742, 743
25 Church St., New York, N. Y.
Will exhibit a variety of Enco Safety Devices for the protection of industrial workers. This includes hoods for dust, such as sandblasting, boiler furnace cleaning; respirators for protection against dust, fumes, etc. Also ray screen for protection of boiler room workers against furnace glare.

Engineers Book Shop 28B
126 E. 41st St., New York, N. Y.
Will exhibit technical books, British and American government documents, special papers pertaining to power, steam, gas, electrical; machinery, design and operation; mechanical equipment of buildings; engineering materials; manufacturing processes in various industries.

Erie City Iron Works 221, 222
Erie, Pa.
See Adv. Page 14

Exhibiting a model of Three Drum Inclined Water Tube Boiler with Integral Economizer and Seymour Basket type Water Cooled Furnace. It will also show the UNITYPE Pulverizer. Also another exhibit which will show concretely the construction of our Seymour Furnace.

Ernst & Co. 76
Newark, N. J.
Manufacturers of Gage Cocks, Water Level Gages, Liquid Level Gages, Water Gages, Water Columns, Gage Glasses, and Gage Glass Guards.

Everlasting Valve Co. 100, 101
1 Exchange Place, Jersey City, N. J.
Will exhibit Regular Everlasting Valve with its improved disc spring. Will also display Everlasting Companion Angle Valve, Everlasting Duplex Blow-off Unit, Everlasting Tandem Valve Model X, Everlasting Valve Special for 500 lbs. and Everlasting Special Water Column Valve.

Ex-cell-o Tool & Mfg. Co. 664
1469 E. Grand Blvd., Detroit, Mich.
Will feature precision parts made for the Diesel Engine Trade—parts being especially fuel injection pump and fuel injection spray nozzle for Diesel Engines. Will also exhibit drill jig bushings and internal grinder spindles. Also other high precision detail parts for Air Craft Engines.

Factory 3M
Cass, Huron & Erie Sts., Chicago, Ill.
Exhibit will show what FACTORY is doing to sell modern power equipment to executives in the industrial field. Graphic charts, clippings of editorials, and advertisements of manufacturers using FACTORY will be exhibited.

Fafnir Bearing Co. 246
New Britain, Conn.
Exhibit will consist of ball bearing power transmission equipment such as hanger boxes, pillow blocks, blower and fan boxes, loose pulleys, etc. Will also exhibit a line of standard ball bearings such as the single row radial, double row, thrust bearings, etc.

Fairbanks, Morse & Co. 326–331
900 S. Wabash Ave., Chicago, Ill.
Will exhibit a Diesel Engine Generating Set, a sectionalized Type H Squirrel-cage Motor "running on a little air," an enclosed Self-ventilated Type HAC Motor sectionalized, various other alternating and direct current motors, a high speed, high head Fig. 870 centrifugal Ball Bearing Pump in operation, and other centrifugal and power pumps.

Falk Corp'n 338, 339
Milwaukee, Wis.
Manufacturers of herringbone gears, herringbone gear speed reducers, flexible shaft couplings, open hearth steel castings, oil engines. Exhibit will show principally speed reducers and flexible couplings.

Farnsworth Co. 605
Conshohocken, Pa.
Will exhibit a newly developed drainage receiver and pump that meters high temperature liquids and records the temperature and indicates the exact time the high temperature water was received as well as delivering it into boiler or to any point of use.

Federal Gauge Co. 535–544
564 W. Adams St., Chicago, Ill.
Manufacturers of Pressure Gages, Vacuum Gages, Liquid Level Controls, Electrically Operated Pressure Regulators, and Electric Thermostats.

Ferner, R. Y., & Co. 647
Investment Bldg., Washington, D. C.
Will show New No. 3 Société Genevoise Jig Boring Machines, and, in addition, will display one or two of Micro-Indicators, with different types of Supports for the same.

Fisher Governor Co. 35
Marshalltown, Iowa
AUTOMATIC SPECIALTIES for the control of steam, air, gas, water and oil. Sectional models and specialties in operation. Also showing Pump Governors, Reducing Valves, Steam Traps, Lever Valves, Liquid Level Controllers, Float Switches, Continuous Drainers, Bac Pressure Valves, Relief Valves, Fluid Mixers, and Strainers.

Flexible Steel Lacing Co. 547
4607 Lexington St., Chicago, Ill.
Exhibit will feature Alligator Steel Belt Lacing, Flexco H. D. Belt Fasteners and Flexco and Flexco-Lok Guards for electric lamps.

Florandin Equipment Co. 298
120 Liberty St., New York, N. Y.
Manufacturers of Hoists and Cranes.

Flynn & Emrich Co. 46
Holliday & Saratoga Sts., Baltimore, Md.
See Adv. Page 112

Manufacturers of many types of HUBER STOKERS will have an exhibition on HUBER MECHANICAL STOKER complete with all refractories and in action, showing method of coal feed to the furnace of the boiler and the control of the fuel bed.

Foote Bros. Gear & Machine Co. 550
213–21 N. Curtis St., Chicago, Ill.
See Adv. Page 67

Exhibit covers complete lines of Spur, Worm and Herringbone reduction units, detailed list of which follow: Display Panel of Assorted Gears, 1W Vertical worm gear reducer, ratio 60 to 1, 12W worm gear reducer, ratio 40 to 1. S-$6^1/_2$ Spur Gear reducer ratio 5.57 to 1. 1W worm gear reducer, ratio 60 to 1. D-5-8 Spur gear reducer, ratio 15 to 1. 8-SH Herringbone reduction unit, ratio 10 to 1. 7DH Herringbone reducer, ratio 17.8 to 1. 4-HGV "HYGRADE" vertical worm gear reducer, ratio 10 to 1. 8 HGH "HYGRADE" double worm gear reduction, ratio 10 to 1 Combination unit, total ratio 1500 to 1, consisting of 1-T-1-6 Spur reducer, ratio 25 to 1. 1-5-W reducer, ratio 60 to 1, with error indicator and mounted on base with $^1/_4$HP motor. $1^1/_4$A IXL Rubber Cushion flexible coupling, Edison Elec. Appliance combination unit with A.C. Motor.

Foster Engineering Co. 84
109–113 Monroe St., Newark, N. J.
Foster Automatic Valves will be on exhibition, but the principal features this year will consist of drop forged, cast steel, chrome constructions, for high boiler pressures and temperatures. In addition to approximately twenty-five or thirty automatic valves, the Foster Sight Flow Box will be

Continued on Page 19

Advertisements of firms listed in color appear on pages indicated

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Booth

shown in actual operation, and complete and sectional models of the Foster Flexible Ball Joint.

Foster Marine Boiler Co.....................20
165 Broadway, New York, N. Y.
See Foster-Wheeler Corp'n.

Foster-Wheeler Corp'n......................64
165 Broadway, New York, N. Y.
Exhibiting a large Aero Unit Coal Pulverizer, ready for operation; Full size sections of Foster Sectional Air Heater; Drawings and photographs of Wheeler Condensers, Pumps, Cooling Towers, Evaporators and Feed Water Heaters; Full size sections of Foster Economizer construction, Foster Tubular Oil Still elements; Wheeler steamjet vacuum pump, and special exhibit of Crescent brand brass and copper tubing and pipe. Full size sections of Foster Superheaters of various types and for different services; Full size section of Foster Water Cooled Furnace Surface; and Full size section of Foster Water Back.

Foundation Co., The..................296, 297
120 Liberty St., New York, N. Y.
Exhibiting pictorially, steam and hydro-electric power house construction completed by the company.

Fox Bros. & Co. (Inc.)......................691
33 Rector St., New York, N. Y.
Will exhibit two types of extractors for the Laundry and Chemical industries; will have a premier showing of the Schaefer Rapid Yarn Beater, the most amazing mechanical invention for the Textile industry ever introduced in America.

Foxboro Company (Inc.)....................62
Foxboro, Mass.
The display of instruments will include Indicating and Recording Thermometers and Pressure Gauges, Draft Gauges, Boiler Water Level Recorders, Tachometers, Flue Gas Recorders, Multiple-pen Recorders and Standard Power-Plant Instruments.

Frank, O. E., Heater & Engr'g. Co............657
20 Milburn St., Buffalo, N. Y.
Will exhibit a heat exchanger having a split shell, giving access to the exterior of all the tube nest without removing the bundle. All parts accessible for cleaning. Will also exhibit a U-Tube Storage type Heater.

Frederick Engineering Co...................406
Frederick, Md.
Manufacturers of Elevated Bins, Steam Jet Conveying Systems, Ash Pit Doors, Cut-Off Gates, and Steam Jet Ash Handling Systems.

Frederick Iron & Steel Co..............405, 406
Frederick, Md.
Will exhibit various types of centrifugal pumps, some in operation, as well as a working model of a coal tipple equipped with the Frederick revolving roll coal separator.

Fuller-Lehigh Co..............................54
Fullerton, Pa.
.................*See Adv. Page 119*
Will have a displayer on which will be shown drawings of installations made by this company, also installations for which we have orders but that have not as yet been completed. Will also show a model of the Calumet Burner and a section of the Bailey Water-cooled Furnace Wall.

Fulton Sylphon Company..........252-253
Knoxville, Tenn.
.....................*See Adv. Page 4*
Products on exhibition will be: Temperature regulators for liquids and air; damper regulators for steam and hot water heaters; pressure reducing valves; hot and cold water mixer; steam and water mixer; duct temperature controller; Sylphon remote control pilot valve; Sylphon packless expansion joints; interlocking valves for fuel oil systems; temperature limit regulators; Sylphon packless globe valves; vent valves for steam heating.

Furnace Engineering Co....................41
5 Beekman St., New York, N. Y.
..............*See Adv. Pages 68, 69*
Exhibiting the Simplex Unit System of pulverizing and burning fuel including the Simplex Unit Pulverizer, Drake Super-Power Burners, and Drake Armor Clad Wall Construction. There also will be an animated picture showing the workings of The Simplex Unit System as well as photographs of installations. Literature will be available. Engineers will be on hand to discuss boiler room problems and demonstrate the merits of The Simplex Unit System. Anyone interested in pulverized fuel should see the Exhibit.

Booth

Fyre-Freez Corporation....................532
17 West 46th St., New York, N. Y.

G & G Atlas Systems (Inc.)...........86-88
537 West Broadway, New York, N. Y.
....................*See Adv. Page 53*
Will exhibit the G & G Atlas Pneumatic Dispatch Tubes, which are used in industrial plants, hotels, banks, newspaper buildings, retail stores, etc. Will have in operation the G & G Atlas Power Saving Control Valve, which saves power and prevents stoppages in the tube line.

Ganschow, Wm., & Co.......................251
1001 W. Washington Blvd., Chicago, Ill.
Exhibit will show principally three types of Planetary Spur Gear Speed Transformers, and one or two types of their new Heavy Duty Worm Gear Power Transformer. There will also be a display of a number of industrial gears.

Garden City Fan Co.........................685
332 S. Michigan Ave., Chicago, Ill.
Exhibit will include a Multiblade Fan driven with Tex Rope Drives on short centers, motor mounted on Fan Casing, a Unit Heater, a Propeller type Ventilating Fan, a Positive Pressure Blower and a slow speed Exhauster for handling materials.

Garlock Packing Co...................545, 546
Palmyra, N. Y.
Will exhibit Quality Control Mechanical Packings made from asbestos, rubber, metal and fibrous materials. Will feature Garlock Oil Return Wall Plate Metal packing and Garlock 800 Varitemp Metal Ammonia Packing on a mechanically operated model. Also Garlock Cord Plugs for cleaning Condenser Tubes and Garlock Condenser Tube packing for packing Condenser Tubes.

General Electric Co.........................4, 5
Schenectady, N. Y.
Exhibit will include motors and control, a centrifugal air compressor, a small turbine battery charging equipment and atomic hydrogen welding. The welding exhibit will be of special interest, featuring the welding of various alloys and non-ferrous metals; also thin material and the production of ductile welds.

General Manufacturing Co................. 647
Detroit, Mich.
Exhibiting power forcing press for straightening shafts and for general forcing work.

General Refractories Co...............344, 345
117 So. 16th St., Philadelphia, Pa.
Will exhibit a structure built up of their sized brick and hand made brick, also samples of Grefco High Temperature Cement, Biasbrix and other refractories.

Gibby Engineering Co.......................468
25 Garvey St., Everett, Mass.
Manufacturers of Boiler Furnace Coal Feeders, Boiler Fronts, Smokeless Boiler Furnaces, Hand Operated Stokers, and Overfeed Stokers.

Gillis & Geoghegan...................86-88
537 W. Broadway, New York, N. Y.
....................*See Adv. Page 52*
Will exhibit the G & G Ash Removal Equipment, as installed in a building. Both electric and hand power models will be shown, and the apparatus will especially emphasize the labor saving and safety features, which protect the operator and pedestrians.

Girtanner Engineering Corp'n..............206
122 Greenwich St., New York, N. Y.
Will show working model of modern ash removal and conveying equipment, including steam jet, hydraulic, steam and fan vacuum and water sluicing systems. Also a model sized storage tank and a complete line of ash pit and furnace doors.

Goetze Gasket & Packing Co................252
50 Church St., New York, N. Y.
Manufacturers of Aluminum, Asbestos, Copper, Corrugated, Iron, Lead, Monel, Corrugated Steel, and Combination Gaskets. Also Asbestos and Metallic Packing. Also Copper Valve Disc.

Golwynne, Henry A., & Co...........429, 430
26 Cortlandt St., New York, N. Y.
Manufacturers of Fire Brick, Fire Cement, Furnace Arches, and Furnace Linings.

Gordon, James T., Co.......................92
50 Church St., New York, N. Y.
Representing Cleveland Worm & Gear Co. and W. H. Nicholson and Co.

Green, A. P., Fire Brick Co.................202
Mexico, Mo.
Manufacturers of Fire Brick, Refractory Cement, Boiler Baffles, Furnace Linings, Plastic Refractories, and Flat Suspended Arches.

Booth

Green Fuel Economizer Co......648, 649, 658, 659
Beacon, N. Y.
Will exhibit portion of tubular and plate type air pre-heaters, forced draft fan, also working model of new device known as Cindertrap which has recently been put on the market for dealing with the cinder problem in large boiler plants.

Grinnell Co...............530-531, 548-549
Providence, R. I.
....................*See Adv. Page 59*
Showing new Triple XXX Line of fabricated piping. Specimens of Triple XXX Laps will be shown including Serrated, Sargol, Tongue and Groove, Plain, etc. Also Test Pieces showing Coupling, Weld, Butt-weld and Lap Joints complete with Lap Joint Flanges and Bolts with Nuts. Also Grinnell Adjustable Pipe Hangers and Supports.

Griscom-Russell Co.........................49
285 Madison Ave., New York, N. Y.
Manufacturers of Pipe Coils, Condensers, Coolers, Deaerators, Evaporators, Extractors, Filters, Heat Exchangers, Heaters, Purifiers, Air Preheaters, Separators, Strainers, Water Softeners, Valves, and Expansion Joints.

Hagan Corp'n..............................21
Bowman Bldg., Pittsburgh, Pa.
Engineers interested in Combustion Control, Steam Purification, Boiler Water Conditioning for the prevention of Scale and Corrosion, De-Superheating, Pressure Control, etc., will find several new Hagan products awaiting them. A working exhibit of the Hagan Centralized Boiler Control System will also be shown. Hagan Steam Purifiers will form an important part of the exhibit.

Hans-Renolds Co...........................342
365 Broadway, New York, N. Y.
Manufacturers of Power Transmission Machinery.

Hardinge Co. (Inc.).................."M"-26
120 Broadway, New York, N. Y.
....................*See Adv. Page 107*
Will exhibit a small working model of new Unit Coal Pulverizer. This Unit Pulverizer incorporates entirely new features. The control of fuel to the burner is instantaneous, and the maintenance of fineness is constant at all capacities or ratings.

Hays Corp'n, The..........................81
Michigan City, Ind.
Will display Combustion Instruments including Flue Gas Analyzers, Portable Combustion Test Sets, Draft Gages, and Automatic Co and Draft Recorders. Also a panel of Hays Pointer Type Gages.

Heat & Power (Inc.)........................726
101 Park Ave., New York, N. Y.
Will exhibit Hardinge Fuel Oil Burners, both automatically and manually controlled, for heating homes, schools, churches, apartment houses and commercial buildings. Single units for any size heating boiler up to 33,000 square feet steam rating.

Heat Transfer Products (Inc.)..............707
90 West St., New York, N. Y.
Manufacturers of Heat Exchangers, Feed Water Heaters and Purifyers, Superheaters, Evaporators, Oil Heaters, Humidifiers, Dehumidifying Apparatus, Power Pinion, Pipe Bends and Pipe Coils.

Heating & Ventilating Magazine Co...........651
1123 Broadway, New York, N. Y.
Exhibiting specimen copies of "Heating and Ventilating" together with text books on heating and ventilating engineering, and heating and ventilating data sheets.

Heine Boiler Co............................24
200 Madison Ave., New York, N. Y.
(See Combustion Engineering Corp'n.)

Hemphill, A. J., Co. (Inc.)..................611
233 Center St., New York, N. Y.
An unique exhibit of Bond Truck Casters in motion, demonstrating advancement made in material handling devices. Also an exhibit of Power Transmitting Machinery and Roller Bearings, for line shaft and Industrial purposes.

Hendrick Mfg. Co...........................431
Carbondale, Pa.
Will exhibit "Mitco" Interlocked Steel Grating, "Mitco" Shur-Site Stair Treads, Perforated Metal Screens and Elevator Buckets.

Henszey Deconcentrator Co..................31
53 West Jackson Blvd., Chicago, Ill.
Will exhibit their system of Continuous Blowdown in which there is a complete

Continued on Page 21

Advertisements of firms listed in color appear on pages indicated

There is a Mason Regulator for every kind of pressure control; designed, built and tested to work efficiently and with the least amount of attention. Their accuracy does not diminish with long continued use. Visit Booths 223-4 at the Power Show.

Ask for copy of Catalog No. 62

Mason Regulators

MASON REGULATOR CO.
Boston, Mass.

Sixth National Exposition of Power and Mechanical Engineering

DIRECTORY of EXHIBITORS

Booths No. 2 to 101—Main Floor—*Diagram on Page 35*
Booths No. 201 to 347—Second Floor—*Diagram on Page 37*
Booths No. 401 to 569—Third Floor—*Diagram on Page 39*
Booths No. 600 to 773—Fourth Floor—*Diagram on Page 41*

Booth

thermal recovery of the heat of the blowdown, and the amount of this blowdown being held in direct proportion to the amount of impurities entering the boiler at that particular time.

Hill, E. Vernon, Co. 212
121 W. Clark St., Chicago, Ill.
Will exhibit air testing instruments, featuring new designs of wet and dry bulb instruments. Also filter gages, Draft gages, Pitot Tubes, Dust testing outfits, CO_2 testing outfits, Psychrometers, Thermometers, Microscopes, Anemometers, and Stop Watches.

Hisey-Wolf Machine Co. 754
Cincinnati, Ohio
Manufacturers of Boring Machines, Grinding Machines, Drilling Machines, Drill Stands, and Screw Driving Machines.

Hoffman Specialty Co. (Inc.) 633, 634
Waterbury, Conn.
Showing a complete line of venting valves for low pressure steam heating work, also featuring both low and high pressure thermostatic traps in operation under actual steam conditions.

Hofft, M. A., Co. 323
814 W. Washington St., Indianapolis, Ind.
Showing a half of a National Stoker and part of a National Arch. Also a new product, the National Automatic Conveyor for conveying refuse fuel into the furnace which will be shown in operation.

Homestead Valve Mfg. Co. 443, 444
Homestead, Pa.
Will show the HOMESTEAD Quarterturn Valves—Straight-way, three-way and four-way patterns, the HOMESTEAD Quarterturn Lubricated Valve; the HOVALCO-HOMESTEAD Combination Blow-off Valve; and the HOMESTEAD Protected Seat Hydraulic Operating Valve. Also showing an entirely new development called the JENNY.

Hubar-Jones Corp'n 689A, 706
13 Astor Place, New York, N. Y.
Will exhibit the Godfrey Oxygen Jet-Cutting Machine for iron or steel. Cuts to a line, leaving edges sharp, sides square. Automatic traverses, special torch, rotary dividing table and controls to secure accurate circular, straight or irregular shaped work.

Huber Stoker Company 46
15 Park Row, New York, N. Y.
Manufacturers of Stokers.

Huhn Mfg. Co. 756
1391 Sedgwick Ave., New York, N. Y.
Manufacturers of Ammonia Packing, Metallic Packing, and Rod, Piston and Valve Packing

Hutchinson Mfg. Co. 704
255 Lafayette St., New York, N. Y.

Huyette, Paul B., Co. (Inc.) 81, 82
5 S. 18th St., Philadelphia, Pa.
Exhibiting open model of Hays CO_2 recorder, Pointer type draft gauges, orsat, and test kit. Will feature the PBH line of water gauges, gauge cocks, gauge glass protector and water gauge adapter; Reliance water columns, Cochrane flow meters.

Hyatt Roller Bearing Co. 497–498
Newark, New Jersey
....*See Adv. Page 98*
Manufacturers of Roller Bearings, and Roller Bearing Hanger Boxes.

Ilg Electric Ventilating Co. 278
2850 N. Crawford Ave., Chicago, Ill.
Manufacturers of Blowers, Air Washing Machines, Exhaust Fans, Unit Heating Systems, and Ventilating Systems.

Illinois Engineering Co. 232
Racine Ave. at 21st St., Chicago, Ill.
Will exhibit a working model of our Eclipse Steam Trap in operation under steam, and also a working model of Vapor Heating System under steam. In addition, will have cut samples of new type of Temperature Control Valve, Pressure Reducing Valve, Back Pressure Valves, Steam Traps, Thermostatic Radiator Traps, Graduated Supply Valves, Vapor System Return Traps and Heat Retainers.

Imperial Coal Corp'n 729
342 Madison Ave., New York, N. Y.
Exhibit of Standard Coals, specially prepared for all types of boiler and stoker equipment.

Industrial Distributors and Salesmen 3N
Cass, Huron & Erie Sts., Chicago, Ill.

Industrial Oil Equipment Corp'n 653
152 West 42nd St., New York, N. Y.
Manufacturers of Lubricators.

Industrial Power 740
608 S. Dearborn St., Chicago, Ill.

Ingersoll-Rand Co. 554–557
11 Broadway, New York, N. Y.
....*See Adv. Pages 70, 71*
Manufacturers of Air Compressors, Condensers, Pneumatic Drills and Hammers, Pumps, Pneumatic Tools, Gas and Oil Engines, Blowers, Gas Exhausters, Turbo-Blowers, Turbo-Compressors, Air Hoists, Turbo-Pumps, etc.

Instant Water Heater Sales Div. 440
Chicago, Ill.

Insulating Products Corp'n 437
280 Madison Ave., New York, N. Y.
Manufacturers of Insulating Products.

International Coal Carbonization Co. 24
200 Madison Ave., New York, N. Y.

International Combustion Engrg. Corp'n 23–25, 25A
200 Madison Ave., New York, N. Y.
(See Combustion Engineering Corp'n.)

International Nickel Co. 9
67 Wall St., New York, N. Y.
Will feature commercial forms of Monel Metal and Nickel metals including rods, sheets, tubes, wire, forgings, castings, etc. Will display a large assortment of various manufactured parts loaned, or donated for this purpose by their respective manufacturers and identified with the name and booth numbers of its maker.

International Steam Engineer 506
6334 Yale Ave., Chicago, Ill.

Iron Fireman Automatic Stoker Corp'n ...682, 683
535 Fifth Ave., New York, N. Y.
Exhibiting the Iron Fireman Automatic (Underfeed) Stoker, automatically controlled, for application to boilers from 5 to 200 HP.

Irving Iron Works Co. 438–439
3rd & Creek Sts., Long Island City, N. Y.
....*See Adv. Pages 56, 57*
Exhibiting IRVING SUBWAY Open Steel Ventilating Flooring, Type "M," and also our STREAMLINE modification of the above, as well as our IRVING VIZABLEDG SAFSTEPS. There will also be on exhibit the new IRVING UNIFIED a system of reinforcement and surface armor for concrete bridge floors.

James, D. O., Mfg. Co. 752
1120–24 W. Monroe St., Chicago, Ill.
Will exhibit samples of Direct and Angle Drive Herringbone Speed Reducers, Direct, Angle and Vertical Drive Spur Gear Speed Reducers, Heavy Duty Worm Gear Speed Reducers, and all types of Industrial Gears.

Jenkins Bros. 90
80 White St., New York, N. Y.
....*See Adv. Page 91*
Exhibiting Bronze and Iron Valves of globe, angle and gate types for standard and extra heavy pressure; Rapid Action for water service; Radiator valves of standard and modulating types; New Forged Steel Valves for superheated steam and high pressure; Mechanical rubber goods of all kinds including sheet packing, and Moncrieff Scotch Gauge Glasses.

Johns-Manville (Inc.) 314, 315
292 Madison Ave., New York, N. Y.
Manufacturers of Asbestos Products, Insulating Cements, Coatings, Coverings, and Facings, Gaskets, Linings, Packing, Roofing, Asbestos Boards, Blocks, Sheets, Cloth, Rope, Tape, Yarn, Tubing and Paper, etc.

Johnson Service Co. 403, 404
Milwaukee, Wis.
Manufacturers of Automatic Temperature Regulating Apparatus. Will exhibit a complete line of thermostats, valves, dampers, air compressors, featuring particularly the Dual system of automatic temperature control; also equipment for the control of dampers and refrigerating apparatus.

Jones, W. A., Foundry & Machine Co. 493
4401 W. Roosevelt Road, Chicago, Ill.
....*See Adv. Page 28*
Assembled and dismantled exhibits of spur gear and worm gear type speed reducers.

Justus Steam Trap Co. 715
Napanoch, N. Y.
Showing different sizes of Steam Traps. One will be an operation to demonstrate the tremendous discharging capacity of the Justus Traps.

Keating, E. F., Pipe Bending & Supply Co. 229
Hartford, Conn.
Showing samples of Reinforced Square Corner Van Stone Joints made from Wrought Iron Pipe and Steel; Large Bends; and Welded Flanged headers. Also coils of various types from brass, copper, steel and wrought iron pipe suitable for refrigerating work, air conditioning, dye house works, etc.

Keeler, E., Co. 211
Williamsport, Pa.
Exhibiting working glass boiler models, which have proved of much interest to Engineers in the past few years, as well as parts of boilers showing the method of construction and design.

Kellogg, M. W., Co. 16
7 Dey St., New York, N. Y.
....*See Adv. Page 58*
Full size samples showing latest developments in the manufacture of piping materials for high pressure steam plant service. Also Dean high pressure power operated parallel slide and swing gate valves.

Kennedy-Van Saun Mfg. & Engr. Co. 291
50 Church St., New York, N. Y.
Showing the Kennedy Airswept Tube Mill System of Pulverizing and Burning Coal. An animated picture, "Scene-In-Action," will be shown portraying the equipment in actual operation as well as the flame travel in the combustion chamber.

Kerr Turbine Co. 271
Wellsville, N. Y.
See Elliott Company.

Keystone Lubricating Co. 3
21st, Clearfield & Lippincott Sts., Phila., Pa.
Will exhibit the Keystone Safety Lubricator in the following types: Manuel Operation, Spring Automatic Operation and Pneumatic Operation. Will have a display in operation. Also Keystone liquid greases and a variety of other Keystone Lubricants.

Keystone Refractories Co. 11
120 Liberty St., New York, N. Y.
Will feature DURA-STIX as the bonding agent for making firebrick monolithic, eliminating the joint. Also STEEL VENEER surface coating for eliminating the natural porosity of firebrick; and the Keystone Sprayer for spraying furnace walls.

Kieley & Mueller (Inc.) 533–53
34 W. 13th St., New York, N. Y.
....*See Adv. Page 62*
Exhibit will consist of Pressure Reducing Valves, Back Pressure Valves, and various items of complete line of Steam Specialties. The articles shown will also have new features of design developed in the past year.

Kilsoot Chemical Co. (Inc.) 721
1834 Broadway, New York, N. Y.
Exhibit consists of a display of different packages, drums of Kilsoot and distribution of advertising matter describing their soot destroyer and carbon remover.

King Refractories Co. (Inc.) 95
1709 Niagara St., Buffalo, N. Y.
Will exhibit "Mono" Boiler Baffles and Special High Temperature Cements of various types. Engineers at the booth will be present to give detailed information regarding these products.

Kings County Lighting Co. 615
6740 Fourth Ave., Brooklyn, N. Y.
Exhibiting Industrial Gas Appliances.

Kingsford Foundry & Machine Works 490
Oswego, N. Y.
Manufacturers of Engines, Pumps and Steam Boilers.

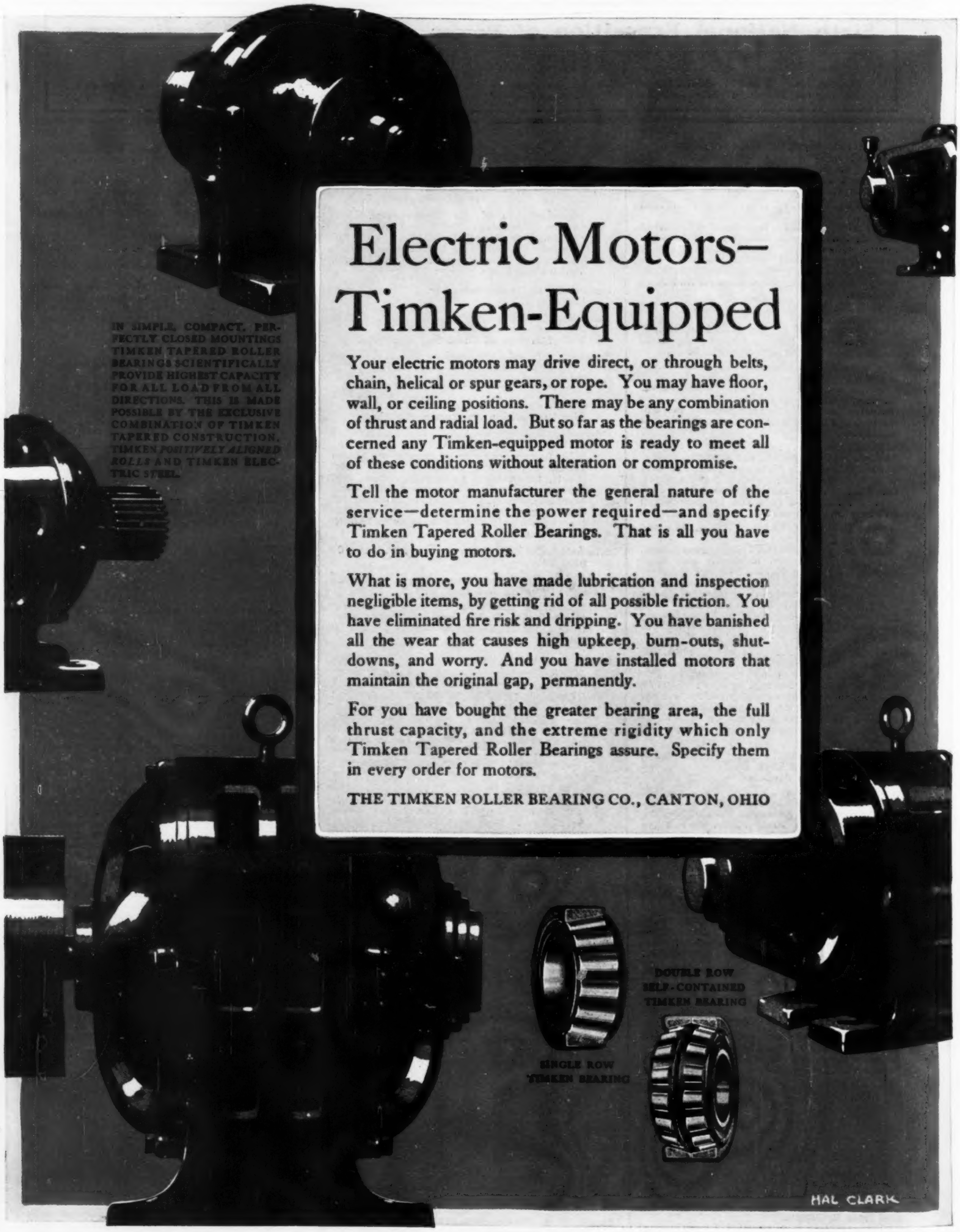
Kissick-Fenno Co. (Inc.) 19
15 Park Place, New York, N. Y.
Representing: Northern Equipment Co. and Vulcan Soot Cleaner Co.

Klemp, Wm. F., Co. 757
6624 S. Melvina Ave., Chicago, Ill.
....*See Adv. Page 104*
Will Exhibit Diamond Grating, a non-slip steel area grating for sidewalks; boiler house floors and balconies; overhead walkways; and power house operating floors and other industrial purposes. Also Diamond stair treads made from the same material for boiler house, power house and industrial purposes.

Klingerit (Inc.) 317
16 Hudson St., New York, N. Y...
Exhibiting Imported, Original Klingerit High Pressure Sheet Packing; Klingerit

Continued on Page 23

Advertisements of firms listed in color appear on pages indicated



TIMKEN *Tapered Roller* **BEARINGS**

Space 2N, *Sixth National Exposition of Power and Mechanical Engineering, New York, December 5-10*

Sixth National Exposition of Power and Mechanical Engineering

DIRECTORY *of* EXHIBITORS

Booths No. 2 to 101—Main Floor—*Diagram on Page 35*
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Booths No. 401 to 569—Third Floor—*Diagram on Page 39*
Booths No. 600 to 773—Fourth Floor—*Diagram on Page 41*

Booth

Two-Color Semi Metallic Stuffing-box Packing compressed ring form; Klingerit Piston Valves; Original Klingerit Reflex Steel High Pressure Boiler Water Gauges; Klingerit Asbestos High Pressure Discs; and Original Klingerit Reflex High Pressure Boiler Water Gauge Glasses.

Kny-Scheerer Corp'n of America............630
10 W. 25th St., New York, N. Y.

Korfund Co. (Inc.)............627
235 E. 42nd St., New York, N. Y.
...................*See Adv. Page 99*
Exhibiting a steam engine built by the Troy Engine and Machine Co., Troy, Pa., mounted on KORFUND VIBRO-DAMPERS. Will also exhibit our regular KORFUND cork plates which are also being used for the isolation of machinery, particularly applicable to large and heavy concrete foundations.

Ladd Water Tube Boiler Co.................25
Pittsburgh, Pa.
(See Combustion Engineering Corp'n.)

Lamont Corporation......................619
200 Fifth Ave., New York, N. Y.
Exhibit will show drawings, pictures and prints of LaMont Steam Generators and the LaMont Duplex Steam Flow Valve. Other drawings and photos will show LaMont Waste Heat Steam Generator and the LaMont Water Wall Screen as applicable to H. R. T. boilers.

Landis Machine Co..........................708
Waynesboro, Pa.
Manufacturers of thread cutting machinery. Will exhibit 6" Landis Pipe Threading and Cutting Machines; Lanco Heads for Threading Machines; Land-Matic Heads for turret lathes; Victor Collapsible Taps; Samples of Valve Stems, Power Plant Specialties, etc., threaded on Landis Threading Machines.

La Porte Machine Tool Co.................647
La Porte, Ind.
Manufacturers of Bench Filing Machines.

Lappin-Toussaint Co.........................508
122 Greenwich St., New York, N. Y.

Lead Lined Iron Pipe Co....................86
Wakefield, Mass.
Exhibiting Lead and Tin Lined Iron Pipe, Valves, Fittings and Stop Cocks, both flanged and screwed.

Leavitt Machine Co........................432
Orange, Mass.
Exhibit consists of the complete line of Dexter Valve Reseating Machines; Machines for reseating Globe Valves, machines for refacing Pump Valve Seats. Practical demonstrations will be made of these machines.

Leeds & Northrup Co..................433–435
4901 Stenton Ave., Philadelphia, Pa.
A complete working demonstration of L & N Automatic Combustion Control for boiler furnaces; CO_2 Recorders and Flue Gas Analysis Instruments; Controllers; Flow Meters; B.T.U. Recorders; Power Totalizing Equipment; Salinometers (conductivity measuring equipment); Hydrogen Ion Recorders; Frequency Meters; Resistance Measuring Equipment; Pyrometers; Recorders; Thermometers.

Leslie Company..........................505
Lyndhurst, N. J.
Will exhibit Leslie Pressure Regulators, Reducing Valves, Pump Regulators, Excess Pressure Regulators, Relief Valves and Strainers.

Lincoln Electric Co.....................766–767
Coit Ave. & Kirby Road, Cleveland, Ohio
Exhibiting "Linc-Weld" motor and "Stable-Arc" welder. The Welder exhibit will include one of the latest portable types mounted on an all arc-welded steel truck. The actual operation of welding with this machine will be shown. The famous exhibit of a "Linc-Weld" motor operating totally submerged in a glass tank filled with water will be shown. Likewise all of the details of construction of the "Linc-Weld" motor will be exposed by dis-assembled parts.

Linde Air Products Co.................265, 266
30 East 42nd St., New York, N. Y.
Will exhibit supplies and equipment for oxy-acetylene welding, including Linde oxygen, Prest-O-Lite Dissolved Acetylene, Oxweld welding and cutting apparatus and supplies, and Union Carbide, also examples of welded construction as applied to power plant applications.

Link-Belt Company....................677–679
910 S. Michigan Ave., Chicago, Ill.
Products shown will be the Sykes Herringbone Speed Reducer, Vibrating Screen, the new Link-Belt Anti-Friction Belt Conveyor Idler, the Caldwell Speed Reducer, the Caldwell Car Spotter, Link-Belt Silent Chain and other Drive Chains. Representatives will give information on other Belt products.

Liptak Fire Brick Arch Co..................202
Mexico, Mo.
Manufacturers of Boiler Arches, and Air Cooled Boiler Furnace Walls.

Liquidometer Co. (Inc.)...................672
173 Thomson Ave., Long Island City, N. Y.
Will exhibit various types of distance reading liquid level tank gauges, both indicating and recording. These instruments use a patented balanced hydraulic principle.

Lloyd Engineering Co......................503
84 Stephen St., Belleville, N. J.

Locke Regulator Co.........................445
76 North St., Salem, Mass.
Exhibiting Pressure Reducing Valves, Damper Regulators, Safety Shut-Off Valves, Automatic Engine Stop Equipment, Float Control Valves, Hydraulic Regulators, Balanced Valves, Non-Return Valves and Exhaust Relief Valves.

Long, E. G., Co.............................752
50 Church St., New York, N. Y.
Representing: D. O. James Mfg. Co.

Lunkenheimer Co.............................63
Cincinnati, Ohio
...................*See Adv. Page 94*
Will exhibit a group of valves representative of our complete lines of Bronze, Iron Body, Monel, and Steel Valves.

McClave-Brooks Co...................561–563
Scranton, Pa.
Exhibiting new McClave Forced Draft Chain Grate Stoker for anthracite, coke breeze and bituminous fuels; McClave type 4-A Dumping Grate for anthracite and coke breeze; Type 2-A Grates for bituminous and lignite; and McClave Hand Fired Stoker for all grades of bituminous fuel.

McLeod & Henry Co..........................13
Troy, N. Y.
Will exhibit several models and numerous full sized units of Flat Suspended Arches. Will also exhibit "Steel Mixture" Furnace Linings, Veneer Wall Blocks, Door Arches, Back Arches, Blow-Off Pipe Protectors, standard Fire Bricks and High Temperature Cements.

McNutt, W. H. (Inc.)........................742
83 Chambers St., New York, N. Y.
Safety Cans used in all places where benzine or gasoline is used. Analox paint is used to flame-proof wood shingles and to prevent corrosion of metals.

Manistee Iron Works Co..............219, 220
Manistee, Mich.
Manufacturers of Water Works, Pumping Engines, Rotary Jet Condensers, Evaporators, Pumps and Pumping Equipment.

Manning, Maxwell & Moore (Inc.)...........60
100 East 42nd St., New York, N. Y.
Exhibiting Ashcroft Gauges, Ashcroft Power Control Valves, Hancock Valves and also Consolidated Safety Valves of various designs.

Mantle & Co. (Inc.).........................575
1907 Park Ave., New York, N. Y.
Manufacturers of Circular Vise and Tools.

Manufacturers Record.......................40
Baltimore, Md.
A weekly business publication, for 45 years "Devoted to the Upbuilding of the Nation Through the Development of the South"—making known the South's resources, and its industrial and agricultural advantages.

Manzel Brothers Co..........................705
309 Babcock St., Buffalo, N. Y.
Will exhibit working models of Manzel Force Feed Lubricators, featuring especially the Manzel Model "82" for timed lubrication of Diesel Engines. Also display of Manzel Lubricators for steam, oil and gas engines, pumps and compressors.

Marlin-Rockwell Corp'n....................337
402 Chandler St., Jamestown, N. Y.
Manufacturers of ball bearings for light and heavy machinery of all kinds, for power transmission purposes, for railway car journal boxes, for automotive vehicles and a large number of other important uses.

Marshall, W. A., & Co......................628
17 Battery Place, New York, N. Y.
Will display trestle and coal pockets for the handling of domestic and steam coals. Also a display of our SHALIMAR and HAVMAR bituminous coals.

Mason Regulator Co...................223, 224
Dorchester Center, Boston, Mass.
...................*See Adv. Page 20*
Exhibiting reducing pressure valves for all pressures, pump governors, damper regulators and a complete working model of No. 132 Fan Engine Regulator and draft control; also back pressure valves and a complete line of balanced valves.

Master Engineering Corp'n............718, 719
405 Lexington Ave., New York, N. Y.
Manufacturers of Stokers.

Maxim Silencer Co...........................654
410 Asylum St., Hartford, Conn.
Maxim Silencer will be shown in operation quieting discharge of small Connersville Blower. Various other models on exhibit include Maxon Silencers for Diesel and gasoline engines, uniflow steam engines, vacuum pumps, continuous gas, steam and air discharges and for intakes.

Mechanical Engineering......................80
29 West 39th St., New York, N. Y.
Published monthly by The American Society of Mechanical Engineers, 29 West 39th St., New York, N. Y. The only technical publication in America which covers all branches of mechanical engineering practice. Copies available for inspection.

Mechanical Manufacturing Co...........732–733
Union Stock Yards, Chicago, Ill.
Manufacturers of Packing House Equipment.

Mercon Regulator Co.........................31
53 W. Jackson Blvd., Chicago, Ill.
Will exhibit its standard lines of pressure regulators, featuring the absence of weights, springs and stuffing boxes, with particular attention to the presentation of the Constant Excess Pressure Regulator used in conjunction with any type of boiler water level controllers.

Merrick Scale Mfg. Co.................237–240
180 Autumn St., Passaic, N. J.
Exhibiting Merrick Conveyor Weightometer weighing coal; Merrick Mechanical Weighman operating on weigh tanks; Merrick Addoweight, which is a totalizing dial scale; and Merrick-Hebden Weightoprint.

Merritt, L. R., & Co.........................32
250 Park Ave., New York, N. Y.
Representing: Springfield Boiler Co.

Metal Stamping Co...........................407
13th St., Long Island City, N. Y.
Exhibiting Convecto Single Tube Radiators for factories and industrial buildings; Convecto Radiators for direct and indirect heating; Convecto Radiators for bathrooms, etc.; Convecto Heat units with Cabinets for direct heating; and Artone Radiator Enclosures.

Midwest Piping & Supply Co..............268
1450 S. Second St., St. Louis, Mo.
...................*See Adv. Pages 78, 79*
Will exhibit for the first time, "Globack" joints for 600, 900, and 1350 pounds pressure piping. The "Globack" joint applies a spherical back face to the lap of the conventional Sargol, tongue and groove, and male and female Van Stone Joints. The flange contact surface is also machined spherically. The "Globack" joint has in the critical section of the lap, a metal thickness equal to twice the original pipe wall thickness. The lap is stiffer and there is a more uniform distribution of the bolting pressure. The maximum stress is removed from the periphery of the lap and the resultant of the bolting force is shifted toward the pipe wall. Microphotographs of "Globack" joint lap sections will indicate the improved structure of the metal resulting from the method of hot working. Other Midwest contributions to the development of high pressure piping will also be shown.

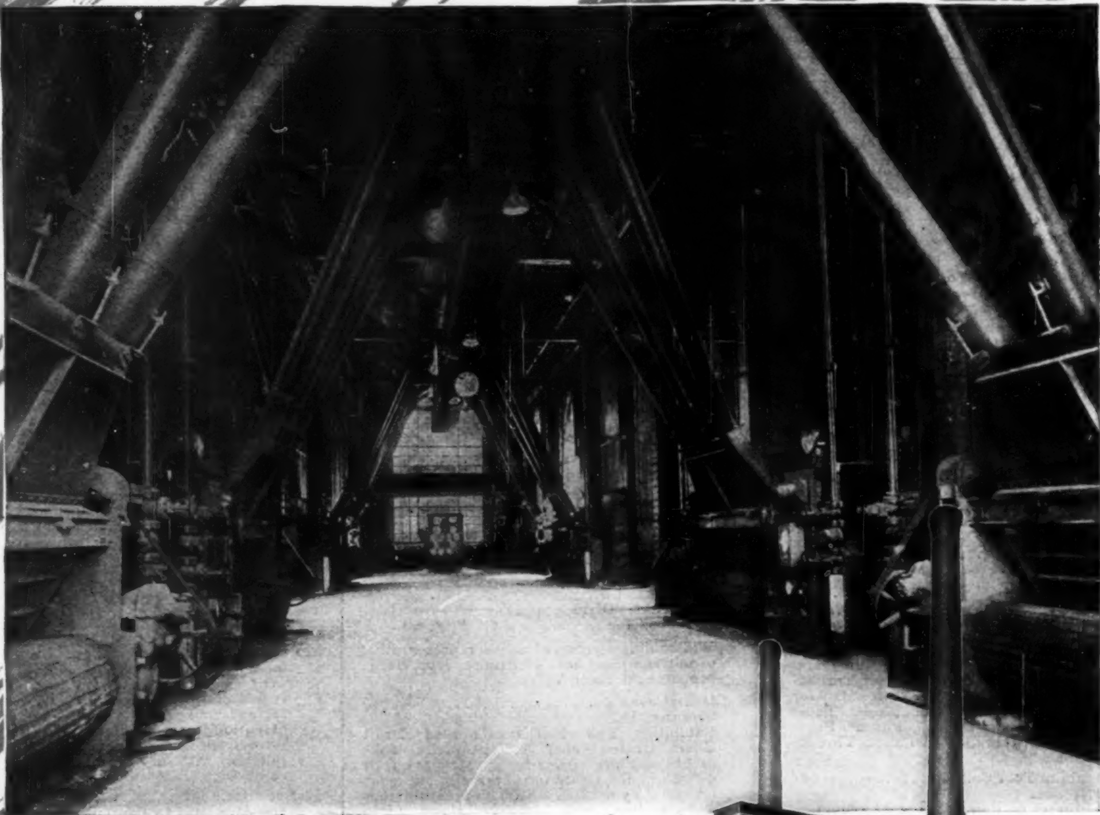
Minute Electric Steam Heater Corp'n.......722
276 East 203rd St., New York, N. Y.

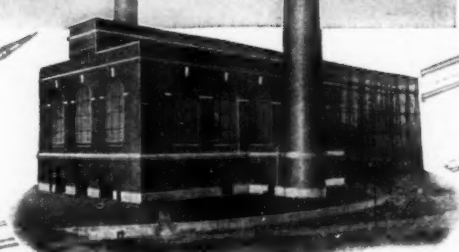
Mixing Equipment Co.......................3E
229 E. 38th St., New York, N. Y.
Will exhibit various models of our Electric Portable Mixers of all sizes and various speeds for mixing all fluid products.

Modine Mfg. Co.............................635
Racine, Wis.
Manufacturers of Unit Heating Systems.

Moore Steam Turbine Corp'n.......508, 509
Wellsville, N. Y.
...................*See Adv. Page 101*
Exhibiting a combined turbine and reduction gear. (This is a new development and will

Continued on Page 25





An installation of eight 755 Horse Power Vogt Water Tube Boilers in a large Eastern Refinery.

Power

The Symbol Of Vogt Water Tube Boilers

HENRY VOGT MACHINE CO.
(Incorporated)
LOUISVILLE, KY.

Manufacturers of: **Oil Refinery Equipment, Drop Forged Steel Valves and Fittings, Water Tube and Horizontal Return Tubular Boilers, Ice Making and Refrigerating Machinery.**

Branch Offices:
NEW YORK
CHICAGO
CLEVELAND
DALLAS
PHILADELPHIA

Sixth National Exposition of Power and Mechanical Engineering

DIRECTORY *of* EXHIBITORS

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Booth

be shown for the first time.) A pinion of a 1500 hp. three-bearing reduction gear; a complete turbine driven boiler feed pump including the pump governor; and a turbine wheel from a 1000 kw. unit.

Morse Chain Co....................263-264
Ithaca, N. Y.
....................*See Adv. Page 36*

Exhibit includes a very comprehensive line of chains as well as a very interesting method of describing their operation. First of all, the Exhibit contains a highly finished chain running on two sprockets with a handle so that it may be propelled. The washers are removed from one side of the link so that the action of the Morse Rocker Joint may be clearly seen. By slowly turning handle, the rocking action of the pins in running from the sprockets is very clearly illustrated. This also shows the flat bearing surface between pins while the chain is between the sprockets. There are also samples of Morse Chains ranging from the smallest 3/8" pitch, to the largest, 3" pitch.

Moto Meter Co. (Inc.)..................256, 257
15 Wilbur Ave., Long Island City, N. Y.
Will exhibit various styles of Motoco Industrial Thermometers for all industrial purposes, also a complete line of small pressure gauges for industrial applications.

Motor Tool Specialty Co....................449
14 E. Jackson Blvd., Chicago, Ill.
Exhibit will consist of the complete standard line of Snap-On interchangeable socket wrenches including ratchet wrenches. Also Blue Point open end wrenches, pipe wrenches, chisels, punches. Also Snap-On sockets and shanks for power nut driving machines.

Mullite Refractories Co....................429
Seymour, Conn.

Murray Conduit Systems..................300
55 Duane St., New York, N. Y.
Exhibit will consist of equipment for the installation of monolithic conduit for high-tension underground transmission and distribution and for general conduit runs in generating plants and sub-stations. The equipment will be shown in operation by means of motion pictures.

Murray, Thos. E. (Inc.)..................301
55 Duane St., New York, N. Y.
Exhibit will be comprised mainly of large drawings, photographs and descriptions of some of their plants, principally the East River Station of the New York Edison Co., and the Kips Bay Station of the New York Steam Corporation. Also some small models of some of their stations, which will be on display.

Mutton Hollow Fire Brick Co...............680
Woodbridge, N. J.
Will exhibit Fire Brick, Special Fire Clay materials; also Insulating Refractory brick and clay, and Super-Refractories in the form of brick, muffles and crucibles; also Pulverized fire clays.

Nash Engineering Co......................66
South Norwalk, Conn.
Manufacturers of Gas Compressors, Air Compressors, Vacuum Pumps, Condensation Pumps, Centrifugal Pumps, Sewage Ejectors, and Condensation Return Systems.

National Acme Co.........................210
Cleveland, Ohio

National Ass'n Stationary Engrs.............82
Chicago, Ill.

National Co...............................76
Malden, Mass.
..................*See Adv. Page 111*

Will exhibit their very successful water column illuminator in which two beams of light directed upon the water column are reflected by the miniscum at the water level; and make the water level distinctly visible from all points in the operating aisle.

National Engineer.......................... 83
Chicago, Ill.

National Lead Co..........................568
111 Broadway, New York, N. Y.
Manufacturers of Babbitt Metal, Expansion Bolts, Red Lead, White Lead, Solder, Lead Wool, Lead Pipe, Lead Wire, Lead Caskets, Lead Washers, Lead Sheets, etc.

National Magnesia Mfg. Co................717
544 Market St., San Francisco, Cal.
Manufacturers of Magnesite.

National Regulator Co.....................671
Chicago, Ill.
Exhibiting apparatus for the control of temperature; samples of boiler regulators for high pressure, low pressure and vapor systems.

National Tube Co......................8A, 8B
Frick Bldg., Pittsburgh, Pa.
Manufacturers of Seamless Steel Tubing, Steel Pipe, Boiler Tubes, Galvanized Pipe, Lap Weld Pipe, and Welded Pipe.

Naugatuck Mfg. Co., The..................481
Naugatuck, Conn.
Exhibiting a full line of our Seamless Copper Floats from 1" to 20" diameter, both spherical and oblong, for use in steam traps, regulators, water governors, water columns, receivers, and Open Tanks. Also floats for use under various steam pressures.

Neemes Foundry (Inc.)......................93
206 First St., Troy, New York
Will exhibit section of Hand Operated Stoker showing complete operating and dumping mechanism, including special detachable, reversible lugs on stoker unit. Also Dumping and Shaking Grates displaying new design of operating mechanism for small furnaces with shallow ash pit.

Nelson, Herman, Corp'n...............608, 609
Moline, Ill.
Manufacturers of Vapor Steam Heating Systems, Ventilation Systems, and Radiators.

New York & Richmond Gas Co..............616
Stapleton, Staten Island, New York
Exhibiting Industrial Gas Appliances.

Nicholson, W. H., & Co.....................92
10 Oregon St., Wilkes-Barre, Pa.
Nicholson Piston Trap in operation, flexible couplings and four-way valves.

Niles Gear Co..........................457-458
111 Broadway, New York, N. Y.
..................*See Adv. Page 93*

Will exhibit various types of high speed gearing and gear drives, especially the Maag Helical, Herringbone and Straight Spur Hardened and Ground Gear for heavy duty and high speed conditions.

Norma-Hoffmann Bearings Corp'n..279-280
Stamford, Conn.
..............*See Adv. Pages 8, 123*

Exhibiting samples of complete line of ball, roller and thrust bearings. This will be supplemented by a number of sectioned motors, reduction gears and other mechanisms in which our bearings are mounted. Will also have on display the Hirth Minimeter, a precision measuring instrument.

Northern Equipment Co.....................19
Erie, Pa.
Exhibiting the Copes Feed Water Regulator in both the standard design and the Type "R" for high pressures, the Copes Pump Governor, the Copes Condensate Control, the Copes Water Level Indicator, the Copes Valve Movement Indicator, and the Copes Control Valve.

Nuttall, R. D., Co........................684
McCandless Ave. & Harrison St., Pittsburgh, Pa.
Will exhibit Speed Reducers, Flexible Couplings, and Miscellaneous items of Heat Treated Gearing. Also particularly featuring the new Nuttall Series of standard Speed Reducers, which are now being built both in single and double reduction.

Oakite Products (Inc.)...............734, 735
22 Thames St., New York, N. Y.
The important part that cleaning plays in connection with the operating efficiency of power plants, will be shown in a series of charts, blueprints and illustrations. A booklet will be distributed.

Obermayer, S., Co.........................260
2563 W. 18th St., Chicago, Ill.
Manufacturers of Foundry Equipment, Refractory Cement, Furnace Linings, Pressure Blowers, Furnace Charging Cranes, etc.

Ohio Valley Clay Co.......................430
Steubenville, Ohio

Olsen, Tinius Testing Machine Co.........318
500 N. 12th St., Philadelphia, Pa.
..................*See Adv. Page 90*

Will demonstrate the very latest production type Brinell Hardness Tester with motor drive, as well as the very latest Olsen Ductility Testing Machine of our No. 2-A type with strain gauge weighing system and motor drive; also our Olsen Charpy Impact Testing Machine, M. I. T. Folding Endurance Paper Tester, Olsen-Boyd Automatic Cement Tester, and various Olsen Extensometers and Strain Gauges. In balancing equipment, will demonstrate an Olsen-Carwin Static-Dynamic Balancing Machine in the most recent type and will also demonstrate for the first time at any exposition the Olsen-Lundgren Automatic Weighing Balancing Scale with motor drive which represents the very last word in equipment for balancing parts statically and which insures the greatest degree of accuracy on a production basis.

Otis Elevator Co............................87
260—11th Ave., New York, N. Y.
..................*See Adv. Page 109*

Will exhibit high-grade electrical steel castings.

Otis Engineer Corp'n.......................60
247 Park Avenue., New York, N. Y.

Oxweld Acetylene Co......................266
Thompson Ave. & Orton St., Long Island, City, N. Y.
Manufacturers of Oxyacetylene Welding and Cutting Outfits. Also supplies.

Paper Mill & Wood Pulp News.............681
1440 Broadway, New York, N. Y.
Showing a large board at the back of booth giving data about the power consumption in the manufacture of pulp and paper on the North American Continent. Publications will be on display.

Peabody Engineering Corp'n................47
110 East 42nd St., New York, N. Y.
Will exhibit Peabody Burners for powdered coal, fuel oil or gas firing, including the newest type, large capacity, Toronto Burner, and the exclusive Peabody innovation of an insulated-front burner which changes the firing aisle from a red-hot canyon to a working place in which men can live and breathe.

Peerless Unit Ventilation Co. (Inc.).....747, 748
Skillman Ave. & Hulst St., Long Island City, N. Y.
Manufacturers of Unit Heating Systems.

Pels, Henry, & Co. (Inc.)..............499, 500
90 West St., New York, N. Y.
Exhibiting Quadruple Combined Type Q-10 for splitting plates, punching, cutting bars, angles and tees and coping; Quadruple Combined Type Q-13; and Concrete Reinforcing Bar Cutter, Open Throat, Type LS-17.

Pennsylvania Crusher Co.............286-287
Liberty Trust Bldg., Philadelphia, Pa.
..................*See Adv. Page 8*

Manufacturers of "Pennsylvania" single Roll Crushers, Hammer Crushers, Bradford Coal Breakers and Cleaners, Grinding Pans, Wet and Dry Types, Jaw and Rotary Crushers, Feeders and Chutes, Special Crushing Machinery.

Pennsylvania Pump & Compressor Co....522, 523
Easton, Pa.
Exhibiting Single Stage Multiple Belt Over-Head Drive Air Compressor in operation; Single Stage and Multi-Stage Centrifugal Pumps including high pressure boiler feed pump, Working Model of air lift pump, and Air Compressor valve models and accessories.

Permutit Company......................3, 28
440—4th Ave., New York, N. Y.
The principal and most interesting exhibit will be a model of Water Softening and Filtering equipment such as is used in industrial plants. This model is about 4 feet long and is made exactly to scale after the design of a large commercial unit that delivers 100,000 gallons per day. Also showing Ranarex instruments for recording CO_2 Gas Density, Ammonia Gas, etc.

Philadelphia Gear Works..................10
Richmond & Tioga Sts., Philadelphia, Pa.
..................*See Adv. Page 65*

Exhibiting different types of Industrial Gears and Pinions and also standard line of Speed Reducing Units.

Pitts & Kitts Mfg. & Supply Co.............451
91 Seventh Ave., New York, N. Y.
Exhibiting Water Columns, Water Gages, gage cocks, pressure regulators, blower regulators, balanced float valves, tank float valves, balanced lever valves, water level controls, pump governors, steam traps, grease and oil traps, back pressure valves thermostats air operated and self contained, differential valves.

Pittsburgh Coal Co.........................716
Pittsburgh, Pa.

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Pittsburgh Piping & Equipment Co.......420, 421
35th & Charlotte Sts., Pittsburgh, Pa.
Manufacturers of Iron and Steel Castings; Iron and Steel Pipe and Flanged Fittings; Flanges; Pipe Bends; Power, Industrial and Process Piping; Pipe Joints; Welded Heads, etc.

Pittsburgh Valve, Fdry. & Constr. Co...........4
P. O. Box 1016, Pittsburgh, Pa.
The main feature of the exhibit will be a large non-return or stop check valve which gives a minimum drop in pressure through the valve. Also, other miscellaneous material as well as photographs of piping as installed at some of the large steam power plants.

Plibrico Jointless Fire Brick Co..............93
1130 Clay St., Chicago, Ill.
Exhibit will consist of a Plibrico wall showing proper installation. The Plibrico movie, "Fighting Furnace Failures." The flexo-anchor for anchoring Plibrico walls. Various photographs and literature.

Poole Engineering & Mch. Co...............467
Baltimore, Md.
Manufacturers of Iron and Steel Castings; Mixing Machinery; Fly Wheels; Gears; Speed Reducing Units; Pulleys, Rolling Mill Machinery; Paint Making Machinery; Special Machinery, etc.

Porter-Cable Mach. Co.....................667
Syracuse, N. Y.
Will exhibit the TAKE-ABOUT Hand Sander, the KWICKSAW, the 10" Belt Sander and Grinder and 15" Disc Sander.

Powell, Wm., Co.......................494, 495
2525 Spring Grove Ave., Cincinnati, Ohio
Will exhibit a complete line of bronze, iron, and steel globe, angle gate, check, and safety valves; also oilers, lubricators, grease cup oiling devices, whistles, oil and water gauges, and other boiler trimmings. Engineers in attendance will help you on your problems.

Power....................................42
10th Ave. & 36th St., New York, N. Y.

Power Age................................624
95 King St., E., Toronto, Ont.
Publishers of Power Age and Fisher's Machinery Guide, technical trade publications devoted to the Power and Electrical, and Machine Tool Metal Working fields respectively.

Power House.............................753
143 University Ave., Toronto, Ont.
Power House will exhibit copies of its regular issues, statistics regarding its circulation and class of readers and will also have on display the Power House Survey, giving thorough illustrations and charts information which advertisers and prospective advertisers will care to have.

Power Plant Engineering....................99
53 W. Jackson Blvd., Chicago, Ill.
Exhibit will show distribution of Power Plant Engineering in the United States. Copies of the December 1st, New York Power Show Number, will be available to visitors without charge.

Power Plant Equipment Co...................76
Coca Cola Bldg., Kansas City, Mo.
Manufacturers of Marley Spray Nozzles, Marley Spray Group Fittings, and Marley steam Superheaters. Engineers and Designers of Spray Pond Installations.

Power Specialty Co..........................64
111 Broadway, New York, N. Y.
See Foster-Wheeler Corp'n.

Powers Regulator Co.......................640
2720 Greenview Ave., Chicago, Ill.
Will exhibit a complete line of temperature and humidity control; regulators to control the temperature of liquids, gases and air; thermostatic regulators; high pressure steam traps and dial indicating thermometers.

Prat-Daniel Corp'n.........................656
101 Park Ave., New York, N. Y.
See Adv. Page 64

Will exhibit THERMIX Air Heater Assembled and THERMIX adjustable SOOT BLOWER for plate type Heaters; will also show Type-I STREAMLINE Stack for high drafts equipped with induced draft fan handling all of the gas, and a Type-III STREAM-LINE Stack (improved fan and ejector system) for low drafts. New Catalogues available. Photographs of Installations are shown.

Pratt & Cady Co...........................48
Bridgeport, Conn.
(See Reading Steel Casting Co.)

Preferred Utilities Co. (Inc.)...........304, 305
33 West 60th St., New York, N. Y.
Fuel Oil Burners for Power Plants, Marine and Industrial use and for Commercial Heating. Capacities of units 1 to 280 gallons oil per hour. Full Automatic Burners for Domestic and other purposes. Capacities 1 to 30 gallons per hour.

Press Headquarters.......................630

Public Service Gas Co. of New Jersey.......617
Newark, N. J.
Exhibiting Industrial Gas Appliances.

Pulmosan Safety Equipment Co..............743
386 Jay St., Brooklyn, N. Y.
Exhibiting a complete line of Safety Equipment for prevention of accidents and inhaling of dangerous fumes and dust. This line will include Respirators, Gas Masks, Sand Blast Helmets, Babbitting Masks, first aid equipment and other safety devices.

Pyramid Iron Products Corp'n.........306, 307
136 Liberty St., New York, N. Y.
Exhibiting both standard Pyramid and Pyramid T type grate bars. Also Pyramid forced draft blowers.

Pyrometer Instrument Co...................501
74 Reade St., New York, N. Y.
The main features of the exhibit will be the Radiation Pyrometer, the new Optical Pyrometer and the new Pyro Tachometer. Each device in the "Pyro" line marks a great stride in the simplification of industrial instruments.

Q & C Company...........................3M
90 West St., New York, N. Y.
The exhibit will include a variety of samples manufactured for different industries which are made of NOGROTH Metal. Also interesting photographs and sample bar specimens that have been taken from many tests of NOGRATH Metal.

Q-P Signal Co............................666
Needham Heights, Mass.
Will exhibit Q-P Self-Setting Packing, Q-P Ratchet Flange Wrench, and Braided Packings.

Quasi-Arc (Inc.)...........................606
11 West 42nd St., New York, N. Y.
See Adv. Page 85

Will exhibit products, consisting of yarn-coated welding rods, for Mild, Manganese, Carbon, Steels, high class boiler work, Overhead Casehardening deposits, Cast Iron repairs, and Stainless Steel, also welding equipment together with various examples of applications, test pieces, photographs.

Queen's Run Refractories Co. (Inc.)........569
West Water St., Lock Haven, Pa.

Exhibit will show examples of high grade furnace brick in wall section formation; specimens of difficult special shapes showing craftsmanship of very high order—the product of workmen who have spent their entire lifetime to this art.

Quigley Furnace Specialties Co.................89
26 Cortlandt St., New York, N. Y.
See Adv. Page 61

Will exhibit HYTEMPITE, a plastic fire brick cement, scientifically compounded for kindred uses; ACID-PROOF CEMENT, a smooth and uniform plastic preparation for bonding and surfacing acid resisting masonry; QUIGLEY REFRACTORY GUN handles premixed plastic refractory materials (Hytempite and aggregate). It shoots the mixture with high velocity at any place in wall or arch; and TRIPLE—A Solution in Black and Colors prevent Corrosion of Iron, Steel, Galvanized and Plated surfaces of Concrete, Stone, Brick, Cork Insulation, Wood, etc.

Ramsey Chain Co. (Inc.)...............292, 293
1031 Broadway, Albany, N. Y.
Showing two operating exhibits; one consisting of nine chains suspended on sprockets operating at 1500 RPM.; another showing a 1" pitch X 12" wide chain freely suspended from a sprocket and attaining a lineal speed of 3100 RPM. There will also be displayed a full line of Ramsey sprockets, pinions and chains.

Rawlplug Co. (Inc.).......................668
66 West Broadway, New York, N. Y.
Exhibiting the Rawlplug, the Rawldrill and the Simbi hammer. The Rawlplug is a a fibre screw anchor that requires a smaller hole than any other anchor. The Rawldrill is a drill for masonry and cuts faster than the usual type. The Simbi electric hammer is an electric hammer for the precussion type of drill.

Ray, W. S., Mfg. Co.......................304
118 New Montgomery St., San Francisco, Calif.
Manufacturers of Rotary Oil Burners.

Raymond Bros. Impact Pulv. Co...............23
1329 N. Branch St., Chicago, Ill.
Manufacturers of Pulverizers with Air Separators.

Reading Iron Co...........................230
Baer Bldg., Reading, Pa.
Manufacturers of Galvanized Lap Welded, Welded, and Wrought Iron Pipe; Boiler Tubes, Etc.

Reading Steel Casting Co. (Inc.).............48
Bridgeport, Conn.
Display consists of 18" Iron Body Bronze Gate Valve, equipped with Motor Control; 12" Series 40 Cast Steel Gate Valve, Monel Trim, equipped with Motor Control; 4" Series 90 Cast Steel Gate Valve, Rustless Steel Trim; and 12" Series 40 Cast Steel Flanged Tee.

Reading Valve & Fittings Co..................48
Bridgeport, Conn.
(See Reading Steel Castings Co.)

Reed Air Filter Co. (Inc.).................209A
215 Central Ave., Louisville, Ky.
Will display a complete Demonstration Unit of the Reed Automatic Air Filter; also working models of Compressor Filters, Furnace Filters, Automotive Filters, Radiator Cabinets, etc.

Reed Engineering Co......................209A
50 Church St., New York, N. Y.
Manufacturers of Air Filters.

Reeves Pulley Co...........................26
Columbus, Ind.
Exhibit will comprise four different designs of REEVES Variable Speed Transmissions, which will be under power and operating so as to show their feature of giving infinite speed regulation and control to any type of production machine or conveyor.

Reliance Elec. & Engr. Co...............620, 621
1040 Ivanhoe Road, Cleveland, Ohio
Will exhibit a line of alternating and direct current electric motors with all their construction details and particularly stress the various means of protecting motors in severe applications.

Reliance Gauge Column Co...................81
5902 Carnegie Ave., Cleveland, Ohio
Will exhibit a forged steel Reliance Water Column; Reliance chrome seat and disc gauge cocks; Reliance high pressure water glass; Reliance forged steel column. Also sectional models showing the working parts of our columns, and water gauges and gauge cocks, and also our electric alarms.

Republic Flow Meters Co.......................6
2240 Diversey Blvd., Chicago, Ill.
See Adv. Pages 50, 51

The chief feature of the exhibit will be the new type Republic Boiler Meter Panel. This panel includes the Republic Multiple Recorder which will record six individual records simultaneously on one wide strip chart. In connection with these panels, there will be a large animated cross-section view of a modern type boiler showing meter connections and points where readings are taken. This display has been designed to show the relationship between various boiler records and their necessity for efficient boiler operation. In addition, there will be shown a complete line of Republic Instruments, including Steam Flow Meters, Water Meters, CO_2 Meters, Draft Instruments, Duplex and Single Record Pyrometers, Indicating Pyrometers, and Liquid Level Indicators and Recorders.

Richardson Scale Co...................283, 284
Clifton, New Jersey
Exhibiting a full size Richardson Apron Feed Automatic Crushed Coal Scale as used for weighing direct from overhead bunker to hopper of automatic stoker or pulverizer—bringing out the importance of weighing coal consumed by each boiler, individually.

Riley Stoker Co.............................79
9 Neponset St., Worcester, Mass.
See Adv. Page 66

Exhibit will consist of an 11'-3" zoned Super-Stoker, a No. 3 Riley Atrita Unit Pulverizer, a No. 3 Riley Flare Type Burner and a Jones Unit Stoker Front.

Robinson, John R..........................650
110 West 34th St., New York, N. Y.
Exhibiting Steelbestos Gaskets for water

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Booth

tube boilers; cannot blow out, and come off intact when cleaning plates. Triple-Blade Tube-Hole Cleaners for cleaning gasket surfaces of water-tube boilers with round holes; and Robinson Surface Condenser Packing.

Roberts Steam Specialty Co. 711
5325 Stanard Ave., Cleveland, Ohio
Exhibiting High Pressure Floats, Laminated Steel-Nickel Processed, Single Wall Steel-Nickel Processed, Copper Etc. Also Aluminum Floats. Also Safety Water Columns, Water Gauges and the Diamond Weighted LEVER Gauge Cocks. Also the Gage-Lite.

Rochester Elec. Products Corp'n 655
89 Allen St., Rochester, N. Y.
Exhibiting Diverter Pole motor generator set designed for floating with storage battery and to carry the normal load, at the same time keeping the battery fully charged, leaving the battery available for emergency power.

Rogers, F. L., & Co. 694
23 S. Jefferson St., Chicago, Ill.
Will give demonstrations of the Wodack Electric Hand Saw, Models B, C and D; the new Wodack Combination Lock Mortiser and Router and the new Wodack Special 1/4 portable Drill.

Rollway Bearings Co. 514
Syracuse, N. Y.
Exhibiting heavy duty radial and thrust bearings including new types of radial bearings to permit axial float, and roller bearing pillow blocks.

Rome Brass Radiator Corp'n 669A, 670
1 East 42nd St., New York, N. Y.
Demonstrating the new era in heat exchanging Robras the new light weight welded all brass heat exchanger for low and high pressure steam heating, hot water heating and blast and unit heating, refrigerating and process work. See the sensational steam heat by wire unit heater, which heats and ventilates without the use of boiler or piping.

Roto Company 11
Sussex Ave. & Newark St., Newark, N. J.
Will exhibit a full line of tube cleaners; also boiler hand hole seat scrapers and cap cleaning machines. Manufacturers of tube cleaning equipment for boilers, water-backs, condensers, evaporators and other tubular equipment.

Ruggles-Coles Engineering Co. 26
120 Broadway, New York, N. Y.
Will show models of Ruggles-Coles Dryer and Hardinge Filter and Clarifier, as well as a Scene-in-Action picture illustrating the principle of operation of the Hardinge Conical Mill and Reverse Current Air Classifier.

Ruggles-Klingemann Mfg. Co. 558-560
Salem, Mass.
....*See Adv. Page 105*
The main feature of the exhibit will be a new line of Servo Motors in both the hydraulic and motor operated type, electrically arranged for centralized control, operation either manually from push button stations, or automatically from a master regulator. Also a new line of Solenoid Operated Valves. In addition to the above control equipment, will exhibit our standard line of Step Action Regulators in both the hydraulic and motor operated types which will include Constant Pressure Regulators, Differential Pressure Regulators, Temperature Regulators, Chronometer Valves, etc.

Ruths Accumulator Co. 91
200 Madison Ave., New York, N. Y.
Exhibit will consist of various accessories used in connection with the Ruths Accumulator, together with photographs, diagrams and full information regarding the function and application of the Ruths Systems of Steam Storage.

S-C Regulator Mfg. Co. 696
Fostoria, Ohio
Manufacturers of Boiler Feeders, Regulators, Governors, Steam Traps, and Liquid Level Controls.

S K F Industries (Inc.) 332, 333
40 East 34th St., New York, N. Y.
Featuring an extensive display of S K F Ball Bearing transmission equipment of all kinds. In addition, several novel devices will portray visually the advantages of anti-friction bearings.

Sarco Company (Inc.) 33
183 Madison Ave., New York, N. Y.
....*See Adv. Page 42*
Will show various types of Steam Traps for the industrial field. Standard and special Temperature Regulators for hot water service tanks, industrial processing, dry kilns, etc. A thermostatically controlled Chill Bath, for use in connection with the testing of glue and gelatin samples, will be shown. This Chill Bath is provided with water circulation and a means of providing a cooling effect. It is designed to maintain constantly a temperature of 10° C. correct within one-tenth of 1° C. A special feature will be the complete Sarco heating line, including Inlet Valves, Thermostatic Traps and other apparatus required for low pressure Vacuum and vapor heating systems.

Sauerman Bros. 520-521
438 S. Clinton St., Chicago, Ill.
....*See Adv. Page 102*
The main features of this exhibit will be a working model of a typical Crescent Power Drag Scraper installation storing and reclaiming coal on ground space adjacent to a power plant. Motion pictures will be shown of a number of Sauerman Scraper Systems handling coal and other bulk materials.

Scandia Mfg. Co. 427
101 Mechanic St., Newark, N. J.
Exhibiting the Bronander Variable Speed Transmission, a mechanical unit which, when receiving power at a constant speed, is capable of delivering an accurate and infinite variety of speeds from zero to full speed in either direction. The entire range is covered without jerks or stops in speed.

Scandinavian Western Importing Co., Ltd. 478
109 Lafayette St., New York, N. Y.

Schade Valve Mfg. Co. 76
2527 N. Bodine St., Phila., Pa.

Schirmer, Baldwin F., Co. (Inc.) 714
342 Madison Ave., New York, N. Y.
Will display Viking Power Pumps.

Schutte & Koerting Co. 334-335
12th & Thompson Sts., Phila., Pa.
....*See Adv. Page 16*
Exhibit will include Steam and Water Jets for pumping liquids and handling air and gases, Stop Check Valves, Multi-jet Condenser, Halpbringer Electric Control with Motor-operated Reducing Valve, Radiafin Tubes, Gear Pumps, Steam Purifier, Desuperheater, Injectors, Oil Cooler, Steam Jet Thermo Compressor, Piston Valves, complete set of photographs and catalogs on Jets, Condensers, Chemical Equipment-Heat Transfer Apparatus, Oil Burning Systems and Valves.

Schwenk Safety Device Co. 570
134-13—59th Ave., Flushing, L. I., N. Y.

Scovill Mfg. Co. 69
99 Mills St., Waterbury, Conn.
Exhibiting various products in a novel setting showing the Scovill factory buildings. There will also be a display showing the different stages in the manufacture of Scovill Cup-drawn Admiralty Condenser Tubing.

Service Recorder Co. 707A
Hanna Bldg., Cleveland, Ohio
Will show the Service Recorder as a "time-clock for machinery." To know when important machines are running and when they are idle is the first step towards increased production.

Shafer Bearing Corp'n 703
173 Lafayette St., New York, N. Y.
Showing Shafer Self-Aligning Roller Bearings for industrial and railway service. A complete line of hanger bearings, pillow blocks, idler rollers, loose pulleys and similar applications will be shown.

Sharples Specialty Co. 92
23rd & Westmoreland Sts., Phila., Pa.
Exhibit will consist of a Sharples Portable Transformer Oil and Lubricating Oil Purifier of the latest style; a Presurtite or fume-proof Super Centrifuge; a cross-section model of the Sharples Super Centrifuge; a Scene-in-Action display demonstrating the action of the machine.

Shaw, A. W., Co. 3N
Cass, Huron & Erie Sts., Chicago, Ill.
Publishers—Copies of their various publications will be available including books on business subjects.

Shaw, Benj. F., Co. 496
Wilmington, Delaware
Will exhibit fabricated piping materials for modern power stations and industrial plants. Engineers at the booth will give detailed information as to our ability to handle piping installations regardless of their size.

Booth

Shays, J. R., Jr. (Inc.) 676
100 Greenwich St., New York, N. Y.
Exhibiting various classes of reproduction work, and will feature new process for reproducing tracings on tracing cloth, either reduced or enlarged to scale, which tracings can be made from good blue prints, line drawings, on heavy paper, or from the tracings themselves.

Shepard Elec. Crane & Hoist Co. 632
Montour Falls, N. Y.
....*See Adv. Page 92*
Two Shepard hoists will be shown in operation; also photographic enlargements of installation views of Shepard equipment in the leading industries; also views of the complete line of hoisting equipment ranging from small hoists of 1/4 ton capacity to overhead electric traveling cranes of 30 tons capacity.

Silent Hoist Winch & Crane Co. 687
762 Henry St., Brooklyn, N. Y.
Manufacturers: Electric and Gasoline Capstan and Drum Winch Car Pullers and Barge Movers; Single and Double Drum Winches and Hoists; Motor Truck Winches and Cranes; Ship Capstans and Windlasses; Cargo and Dock Winches; Worm Gear Speed Reducers.

Simmons, John, Co. 519
110 Center St., New York, N. Y.
Will exhibit Van Stone Joints, Wrought Headers, Bends and other Fabricated Pipe. The Burnrite Combustion Device for fire doors will be shown. Also the Keckley Water Gauge with Patented Stuffing Box and Gland with Swing Bolts.

Simplex Oil Heating Corp'n 652
87 Broadway, Providence, R. I.
Manufacturers of Pressure Blowers, Fuel Oil Pumping Outfits, Oil Burners and Oil Burning Systems.

Simplex Valve & Meter Co. 76
68th & Upland Sts., Phila., Pa.
....*See Adv. Page 110*
Exhibiting in cross section a Simplex Meter Register, of the indicating, recording, totalizing type, for use with a Venturi tube. It will be mechanically operated, so as to plainly illustrate the functioning of the internal parts of the meter. Will also exhibit the latest type metering equipment, for the Power Plant, to be used on lines for Boiler Feed, Condensate makeup, etc.

Skeen, D. H., Co. 31
1362 Monadnock Block, Chicago, Ill.
Manufacturers of Governors, Regulators and Valves.

Skidmore Corporation 456
1535 Dayton St., Chicago, Ill.
Will exhibit a Skidmore Return Line Vacuum and Boiler Feed Pump on interceptor base. A cut section of the unit will also be shown showing the asembly.

Skilsaw (Inc.) 688
3814 Ravenswood Ave., Chicago, Ill.
Exhibiting SKILSAW, the portable electrical hand saw, whose astonishing power and efficiency, speed and versatility has been a large factor in reducing building costs. Exhibit will include three models.

Smidth, F. L., Co. 281-282
50 Church St., New York, N. Y.
....*See Adv. Page 97*
Exhibiting the Lenix Short Center Belt Drive. In demonstrating the Lenix drive, a model will be on display which will show the automatic action of the Lenix in responding to variations in the load applied to a driven pulley. Will also have a model on which will be given a visual demonstration by the stroboscopic method of the power lost through belt slippage.

Smith-Monroe Co. 274
South Bend, Ind.
Will exhibit the Gas Compressed Air Separator.

Smith & Serrell 85
20 Washington Place, Newark, N. J.
Will exhibit the five types of FRANCKE flexible couplings for direct connected and geared motor, turbine and engine drives; the improved, bushed laminated-pin type being used to handle all usual accidental misalignments, to provide endwise displacement of the connected shafts, to cushion load shocks, etc.

Smoot Engineering Corp'n 417-419
136 Liberty St., New York, N. Y.
Smoot Control will be shown regulating the

Continued on Page 31

Advertisements of firms listed in color appear on pages indicated

Sixth National Exposition of Power and Mechanical Engineering

DIRECTORY of EXHIBITORS

Booths No. 2 to 101—Main Floor—*Diagram on Page 35*
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Booths No. 600 to 773—Fourth Floor—*Diagram on Page 41*

Booth

input of fuel and air to a gas fired boiler. The steam output of this boiler is variable, the changes from minimum to maximum output taking place continuously. The Smoot Regulators and the Smoot Master Controller maintain a uniform steam pressure and a constant percentage of CO_2 in the flue gases, by maintaining a correct ratio between input and output of the boiler.

Snap-On Wrench Co. 449
14 E. Jackson Blvd., Chicago, Ill.
Exhibit will consist of the complete standard line of Snap-On interchangeable socket wrenches including ratchet wrenches. Also Blue Point open end wrenches, pipe wrenches, chisels, punches. Also Snap-On sockets and shanks for power nut driving machines.

Southern Power Journal 10
Grant Bldg., Atlanta, Ga.

Sowdon & Greene 76
342 Madison Ave., New York, N. Y.
Will exhibit Venturi Tube Meters, Sewage and Water Works Control and Metering equipment. Spray nozzles and Cooling equipment. Gauge Illuminators and Electric Structure doors and hardware. Water Columns and Gauges. Steam and Water Specialties. Coal Pulverizing equipment.

Spencer Turbine Co. 452, 453
Hartford, Conn.
Exhibiting the Spencer Turbo Compressor which is used very extensively for supplying air in connection with oil and gas burning industrial furnaces, foundry cupolas, etc. Will also have in operation the Spencer Stationary Vacuum Cleaning Equipment, which is installed in a very large percentage of the finest buildings of all types, as well as in many of the modern industrial plants.

Springfield Boiler Co. 32
1901 E. Capitol Ave., Springfield, Ill.
See Adv. Page 96
Exhibit will consist of parts of the Springfield Water Tube Boiler. Illustrations will also be shown.

Squires, C. E., Co. 663
East 40th St. & Kelly Ave., Cleveland, Ohio
Will exhibit the Genuine Squires Steam, Air and Gasoline Traps with models showing interior construction and operation. Also Squires Reducing Valve. Will have catalogs and literature on the full line including Squires Pump Governors and Boiler Feed Water Controllers.

Standard Steel & Bearings (Inc.) 336
Plainville, Conn.
See Adv. Page 95
Exhibiting two aircraft engines of the lates type, in which SRB Annular Ball Bearings are used, and will also exhibit SRB ball bearings of various sizes. The aircraft feature will be of particular interest, because of the wide-spread publicity which aviation is receiving at the present time. The layman will have an opportunity to view at close range the particular engines of the types used in record-breaking flights during the past year.

Staynew Filter Co. 571, 572
Rochester, N. Y.
Manufacturers of Air Filters.

Steacy-Schmidt Co. 26
230 E. Hay St., York, Pa.
Manufacturers of Dryers, Dust Collectors, Vacuum Pans, Coal and Ash Bunkers, Iron castings, Coal and Ash Hoppers, Steel Stacks, Tanks, Steel Plate Construction, etc.

Sterling Engine Co. 446, 447
1252 Niagara St., Buffalo, N. Y.
See Adv. Page 99
Exhibit will consist of the Coast Guard and Dolphin Commercial engines and a collection of parts used in the construction of these engines. Featuring a color sketch of industry for which Sterling engines have been applied as emergency stand-by units and power plants, such as railcars, fire pumpers, electric power standbys and bridge lifts.

Stimmel Winch & Machine Works 603
542 West 22nd St., New York, N. Y.
Will exhibit an electric horizontal drum winch, vertical capstan winch, and several other styles. Representative at the booth will be glad to demonstrate and explain the use of these machines.

Stockham Pipe & Fittings Co. 472
Birmingham, Ala.

Strand, N. A., & Co. 700
5001 North Lincoln St., Chicago, Ill.
Will exhibit a complete line of flexible shafts and flexible shaft equipment in sizes from 1/16th to 2 H. P. capacity.

Booth

Sturtevant, B. F., Co. 410-414, 483, 484
Hyde Park, Boston, Mass.
See Adv. Page 60
Exhibiting New Turbovane Induced Draft Fan, featuring automatic control; Sturtevant Turbovane Designs 5 Forced Draft Fan, featuring the alloy steel blades and heavy rugged construction of center blades and side plates, shafts and bearings; Turbine & Gear; the turbine to be equipped with automatic control; a Plate Type of Air Pre-Heater, featuring the removable and reversible chambers, an exclusive feature with Sturtevant; and the Tubular Type of Air Pre-Heater featuring lead coated tubes, inside and out, to resist corrosion; Also a coal burning blower for household purposes, and for use in connection with buckwheat coal. Our new Wind-O-Vane Fan for exhausting and supplying air to kitchens. A design 5 Propeller Fan for exhausting from restaurants, hotels, billard rooms, etc. A unit ventilator for use in schools, public buildings, etc. A unit heater for use in factories. Also displaying Vacuum Cleaner Equipment for use in industrial plants. These will be working models in the hands of demonstrators, and show machines and tools used for collecting dust and dirt for various industries.

Sturtevant Mill Co. 604
Dorchester, Boston, Mass.
Exhibiting Motor Driven Automatic Coal Crusher and Sampler and a small size Sturtevant Whirlwind Centrifugal Selector. Also, samples of material representing work accomplished by the very extensive line of Crushing, Grinding and Separating equipment.

Sumet Corporation 515
1543 Fillmore Ave., Buffalo, N. Y.
The Sumet Exhibit will consist of various bearings, cored and solid bars made of Sumet Bearing Bronze. It is claimed by the Manufacturer of the metal that it embodies the strength of the bronze bearing with the anti-frictional qualities of babbitt.

Sunlike Illuminating Co. 460
475 Fifth Ave., New York, N. Y.
Will exhibit illuminating apparatus reconstructing sunlight and diffused daylight of correct spectral quality from artificial source. Excess of red and yellow rays are not filtered out with a great loss of luminosity, but corrected by reflection. Sizes range from 50 watts to 1000 watt types.

Superheater Co. 56
17 East 42nd St., New York, N. Y.
The feature of the exhibit will be enlarged detailed layouts of boilers with Elesco superheaters for a number of prominent plants. These layouts are indicative of the tendencies in steam power plant design today.

Swartwout Co. 696, 697
18511 Euclid Ave., East Cleveland, Ohio
Will exhibit S-C Feed Water Regulators for pressures up to 1500 lbs. Also S-C Pump Governors, Drainage Controls, Master Controls and Heater Controls. Also Swartwout Separators for air and steam, also high and low pressure traps, Feed Water Heaters and Ventilators.

Sweet & Doyle Fdry. & Mch. Co. 477
Troy, New York
Will exhibit a Universal Power Collar Folding Machine, adaptable for folding Collar Bands, Neck Bands, Tops, Pockets, Etc., etc., and a Semi-Automatic Garter Pad Folding Machine, adaptable for folding intricate shapes within the limitation of the machine, such as Collar Tabs, Garter Pads, Suspensory Parts, etc., etc.

Sweets Engineering Catalog 27
119 W. 40th St., New York, N. Y.

Sword-Silent Oil Burner Corp'n 699
1845 Broadway, New York, N. Y.
Manufacturers of Oil Burners.

Sword & Kimber 699
4861 Stenton Ave., Philadelphia, Pa.
Manufacturers of Oil Burners.

System 3N
Cass, Huron & Erie Sts., Chicago, Ill.
The Magazine of Business.

Tagliabue, C. J., Mfg. Co. 59
18-88 Thirty-Third St., Brooklyn, N. Y.
The feature of the TAG Exhibit is the Steam Operated Controller for temperature or pressure. Another feature will be TAG air operated controllers for pressure, temperature, humidity, condensation, etc. TAG Recording Thermometers and Pressure and Vacuum Gages will be displayed. Also mercury recording thermometer and the new electrically operated TAG Mono Flue Gas Analysis Indicator Recorder will be shown.

Booth

Talcott, W. O., & M. W. (Inc.) 723
91 Sabin St., Providence, R. I.
Will exhibit various styles of belt fasteners for leather, rubber and woven, transmission belts and conveyor belts together with specimens of tests which have been made in leather belting and woven belting showing the strength of various types of fasteners.

Taylor Instrument Cos 507
Rochester, N. Y.
The main features of our exhibit will consist of a complete display of instruments with the well known trade mark Tycos, for use in the power plant and industrial field for temperature and pressure measurement and control.

Templeton Bros. 274
Boston, Mass.
Will exhibit return traps for boiler feeding and pumping. It will be a working exhibit operated by compressed air.

Terry Steam Turbine Co. 207-209
Terry Square, Hartford, Conn.
See Adv. Page 18
Will exhibit the rotor of a 500 KW multi-pressure turbine; a standard Terry wheel turbine with cover raised exposing to view the solid one piece Terry wheel; a Terry herringbone gear. This type of gear is suitable for either speed increasing or speed reducing service. It is particularly designed for the high speeds encountered in turbine practice; A representative exhibit of Terry flexible shaft couplings. These, like the gears, are especially designed for the turbine speeds; and for the first time we will show the Terry turbine stoker drive. This is an entirely new machine designed for direct connection to the power box of stokers.

Texas Company, The 641, 642
17 Battery Place, New York, N. Y.
Manufacturers of Lubricants and Lubricating Oils.

Thatcher Stoker Co. 468
25 Garvey St., Everett, Mass.
Manufacturers of Stokers.

Tide Water Oil Sales Corp'n 15A
11 Broadway, New York, N. Y.
Exhibiting Tycol Industrial Oils and Greases.

Timken Roller Bearing Co. 2N
Deuber Ave., Canton, Ohio
See Adv. Page 22
Exhibit will consist of bearings of the type used in railway journal boxes, of the type used on steel mill roll necks, of both single and double row bearings for electric motors, and a general assortment suitable for use on machinery in general.

Toledo Pipe Threading Machine Co. 720
Toledo, Ohio
Will exhibit threading and cutting tools from 1/8" to 12" inclusive, both hand and power operated, also production pipe machine.

Toledo Scale Co. 724, 725
3216 Monroe St., Toledo, Ohio
Will have on display several models of Toledo Automatic Bench scales as well as portable and larger models of self contained dormant scales. Will also have the lever system for hopper scales used in measuring coal consumption.

Topping Brothers 512, 513, 524-527
159 Varick St., New York, N. Y.
Distributors of Engineering Products.

Torchweld Equipment Co. 525
224 N. Carpenter St., Chicago, Ill.
Exhibiting Gas Welding and Cutting Apparatus.

Trill Indicator Co. 745
38 South St., Corry, Pa.
Will exhibit a full line of Engine Indicators to include the Outside Spring Indicator, Closed Diagram Continuous Card Indicator, Open Diagram Continuous Card Indicator, Trill Direct Reading Planimeter, and the Corry Noiseless Rotating Check Valve, also Indicator supplies.

Tri-Lok Company 401, 402
5555 Butler St., Pittsburgh, Pa.
See Adv. Page 117
Manufacturers of ventilated steel flooring and safety steps armor-units for concrete floors and stairways.

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Booth

Triplex Machine Tool Co. 646, 647, 661
50 Church St., New York, N. Y.
Representing: Williams Tool Co.; La Porte Machine & Tool Co.; General Manufacturing Co.; Edlund Machinery Co.

Uehling Instrument Co. 45
473 Getty Ave., Paterson, N. J.
Exhibiting the new Electrically Operated Apex CO_2 Recorder and Indicator. With this type of instrument, all steam, all water, all exhaust and all drain lines are entirely eliminated, furthermore, delicate galvanometers and batteries are not necessary. Also featuring the Uehling Combined Barometer and Vacuum Recorder.

Unishear Co. (Inc.) 475, 476
170 Fifth Ave., New York, N. Y.
Manufacturers of Plate Shears.

U. S. Electrical Tool Co. 700
Cincinnati, Ohio
Exhibiting portable drills, tool post grinders, bench and pedestal grinders.

United States Testing Co. (Inc.) 689
316 Hudson St., New York, N. Y.
Exhibit will stress the testing of coal for moisture, volatile matter, fixed carbon, ash, sulfur and British Thermal Units; carbon, hydrogen, nitrogen, sulfur, ash and oxygen. Also the testing of fuel oils for specific gravity, flash point, viscosity, water and sediment, ash B. T. U., and sulfur.

Viking Pump Co. 714
Cedar Falls, Iowa
Manufacturers of Power, Rotary and Vacuum Pumps.

Vincent-Gilson Engrg. Co. (Inc.) 17
30 Church St., New York, N. Y.
Representing: Andrews Bradshaw Company and Diamond Power Specialty Co.

Vinco Company 217, 218
75 Vesey St., New York, N. Y.
Manufacturers of Boiler Compounds and Boiler Settings.

Vogt, Henry, Machine Co. 269-270
10th & Ormsby Sts., Louisville, Ky.
.... *See Adv. Page 24*

Exhibiting regular line of drop forged steel valves and fittings for high pressures and temperatures which are widely used in refineries, central stations, and similar installations where high pressures and temperatures are used. Some of space will also be devoted to a boiler exhibit, a feature of which will be an electric sign of large proportions indicating the internal workings of the Vogt Water Tube Boiler.

Vulcan Radiator Co. 407
Hartford, Conn.

Vulcan Soot Cleaner Co. 19
Du Bois, Pa.
Will exhibit our improved and latest model of Self-contained Vulcan Valve Operating Head, as well as an improved type of Ratchet Operating Head. Also high temperature Chrome Alloy Crodon Elements, as well as miscellaneous soot cleaner parts.

Wahlstrom Tool Co. 427
5520 Second Ave., Brooklyn, N. Y.
Plant engineers will see an oscillating tapping attachment, and Automatic Quick-Acting Chuck and a Blind Hole Safety Tapping Device, which attachments will demonstrate the unusual possibilities of time and labor saving.

Wailes Dove-Hermiston Corp'n 261, 262
17 Battery Place, New York, N. Y.
Manufacturers of Industrial Paints and Metal Protecting Coatings.

Waite & Davey Co. (Inc.) 58
17 East 42nd St., New York, N. Y.
Manufacturers of Fire Brick.

Wallace, J. D., & Co. 692
134 S. California Ave., Chicago, Ill.
Exhibiting the Wallace Line of Portable Direct Motor Driven Woodworking Machines. These machines are applicable to every branch of the woodworking industry.

Walsh & Weidner Boiler Co. 72
Chattanooga, Tenn.
.... *See Adv. Page 103*

Will show a longitudinal cross section of a 54" diameter 450 lb. W. P. boiler drum, with heads shrunk on the outside of the ends, equipped with high pressure water columns and Walsh & Weidner new high pressure water gauge. Also full size sections of 650 lb. W. P. and 1400 lb. W. P. Forged Steel Sectional Headers, full size model of the Walsh & Weidner new solid water wall with section of casing and drawings and photographs of various prominent installations.

Walworth Co. 44, 308-311
88 Pearl St., Boston, Mass.
Will show a complete line of Walworth Sigma Steel Valves for high-pressure, high-temperature working conditions and a line of our highest grade brass valves, sectioned and mounted on boards. Also improved Walworth Master Stillson.

Wappat Gear Works 772
Meade St. & Braddock Ave., Pittsburgh, Pa.
Will exhibit and demonstrate portable electric handsaws, electric hand planes and electric lock mortisers, for use on building operations and in maintenance departments of all industries.

Warren Steam Pump Co. 230, 231
Warren, Mass.
Will exhibit centrifugal pumps and steam driven reciprocating pumps. Among exhibits will be a 4" single stage high speed pump for operation at 3600 RPM.

Watrous Super-Pump Co. 714
342 Madison Ave., New York, N. Y.

Watts Regulator Co. 39
250 Lowell St., Lawrence, Mass.
Manufacturers of Governors, Regulators and Valves.

Wave Cut File & Tool Corp'n 669
44 Beaver St., New York, N. Y.
Will exhibit Wave Cut Files containing 1.2 carbon. The wavey feature of the files make them self-cleaning and non-clogging. They can be used on any material except lead and babbitt. Will also exhibit forged vises which are guaranteed to last forever.

Webster, Warren, & Co. 226
Camden, New Jersey
Will exhibit the newest developments and refinements in Webster Systems of Steam Heating and Webster System Equipment, also Webster Series 78 Traps for process steam pressures.

Welding Engineer 441
608 S. Dearborn St., Chicago, Ill.
Exhibit will consist of magazines and books relating to all of the fusion welding processes and literature prepared especially for the assistance of welding departments in large industrial plants.

Westinghouse Elec. & Mfg. Co. 564-566
East Pittsburgh, Pa.
There will be exhibited a 200 KW Geared, turbine generator unit, one 100 hp. mechanical drive turbine, one 2KW., 125-volt direct current turbine generator unit and one 4" priming ejector.

Weston Electrical Instr. Co. 510, 511
49 Weston Ave., Newark, N. J.
Featuring the Weston Model 44 Speed Indicator together with our Rectangular meters. Also a line of both switchboard and portable A. C. and D. C. instruments.

Wheeler, C. H., Mfg. Co. 77
Lehigh & Sedgley Aves., Philadelphia, Pa.
Exhibiting Three Stage Radojet Air Pump for high vacuum; Two Stage Radojet Air Pump with Combined Inter and After Surface Condenser; Cross Sectional Model of Two Stage Radojet Air Pump; Cross Sectional Drawing of the Leach Fracto Control Condenser; and numerous other drawings and photographs of Condenser Installations and Auxiliaries.

Wheeler Condenser & Engrg. Co. 64
Carteret, N. J.
(See Foster-Wheeler Corp'n)

White, S. S., Dental Mfg. Co. 653
84 Market St., New York, N. Y.
Manufacturers of Boiler Tube Cleaners, Drilling Machines, Flexible Shaft Outfits, Grinding Machines, Electric Pyrometers, Die Sinking Machines, Flexible Metal Tubing, and Grinding Wheels.

Whitney Mfg. Co. 250
Hartford, Conn.
.... *See Adv. Page 6*

Will show a moving exhibit covering the three types of WHITNEY Chains for power transmission. These chains include the WHITNEY Double Bearing Pin & Bushing Type Silent Chain, which is designed for moderate speeds and heavy loads; the WHITNEY Rolling Joint Type Silent Chain designed to operate at high speeds with minimum lubrication and great quietness, and the WHITNEY Standard Steel Roller Chain designed to transmit heavy loads at slow speeds.

Wickes Boiler Co. 285
Saginaw, Mich.
.... *See Adv. Page 87*

Exhibit will consist of a lantern slide machine which will show shop operations used in the construction of boilers, as well as views of actual installations. A section of a Wickes patented single joint header used in horizontal cross drum boilers will be on display. A model of the new Wickes three-drum curved tube boiler will be displayed, with photographs of installations. Technical educational bulletins and descriptive literature will be available for distribution.

Williams Tool Corp'n 661
Erie, Pa.
Manufacturers of pipe threading machines.

Wing, L. J., Mfg. Co. 61
352 W. 13th St., New York, N. Y.
.... *See Adv. Page 32*

Will exhibit Wing Turbine Blowers for supplying forced draft to stokered and hand-fired boilers, also motor driven forced draft blowers used primarily for burning the small anthracites in low pressure boilers; Wing Featherweight Unit Heaters, of the overhead suspended type, for heating industrial and wide-area buildings; Wing-Scruplex Exhauster and Fan.

Wood, John, Mfg. Co. 605
Conshohocken, Pa.
Manufacturers of Automatic and Non-Automatic Storage Gas Water Heaters.

Wood's, T. B., Sons Co. 479, 480
Chambersburg, Pa.
Will exhibit our complete line of Power Transmission Machinery. Flexible Couplings, U. G. Automatic Belt Contactors, Ball Bearing Transmission Appliances and U. G. Shaft Hangers will be especially stressed.

Worthington Pump & Mchy. Corp'n 487-489
115 Broadway, New York, N. Y.
.... *See Adv. Page 13*

Manufacturers of Pumps and Pumping Outfits; Steam Accumulators, Air Compressors, Condensers, Gas Engines, Oil Engines, Heaters, Purifiers, Meters, Valves, etc.

Wright-Austin Co. 255
315 W. Woodbridge St., Detroit, Mich.
Will exhibit a line of Separators, Water Columns, Exhaust Heads, and especially three (3) types of Steam Traps, which between them cover the Steam Trap field very thoroughly.

Wright Mfg. Co. 698
Lisbon, Ohio
Manufacturers of Chain Hoists, Timken Bearing Trolleys, Hand Traveling Cranes, Jib Cranes, Winches, etc. The exhibit will feature Wright High Speed Hoists, ball bearing type; special Trolley hoists for limited headroom conditions, and Hand Cranes.

"X" Laboratories 259
25 W. 45th St., New York, N. Y.
Manufacturers of compounds for sealing radiators and boilers.

Yale & Towne Mfg. Co. 622-623
Stamford, Conn.
.... *See Adv. Page 100*

Display will consist of electric industrial high-lift and low-lift trucks, from two to five-ton capacity, also tractors and trailers. Two special features in this line will be the new Yale 3-ton capacity Model K-25 High-Lift Truck and the new Yale Model K-26 5-ton capacity Low-Lift Industrial Truck. There will also be a display of chain hoists of the differential, screw-geared and spur-geared types, as well as electric chain hoists, cranes and crane ends.

Yarnall-Waring Co. 7A, 7B
Chestnut Hill, Philadelphia, Pa.
Exhibiting a full line of YARWAY Blow-Off Valves. A working model of a YARWAY Spray Pond equipped with YARWAY Involute Spray Nozzles and fittings. YARWAY High and Low Pressure Water Columns with YARWAY Secure Inclined Water Gauges. Also other YARWAY products, including YARWAY-Lea V-Notch Meter, YARWAY Hydraulic Valves, YARWAY Pipe Joint Clamps and YARWAY Holtite Pipe Clamps.

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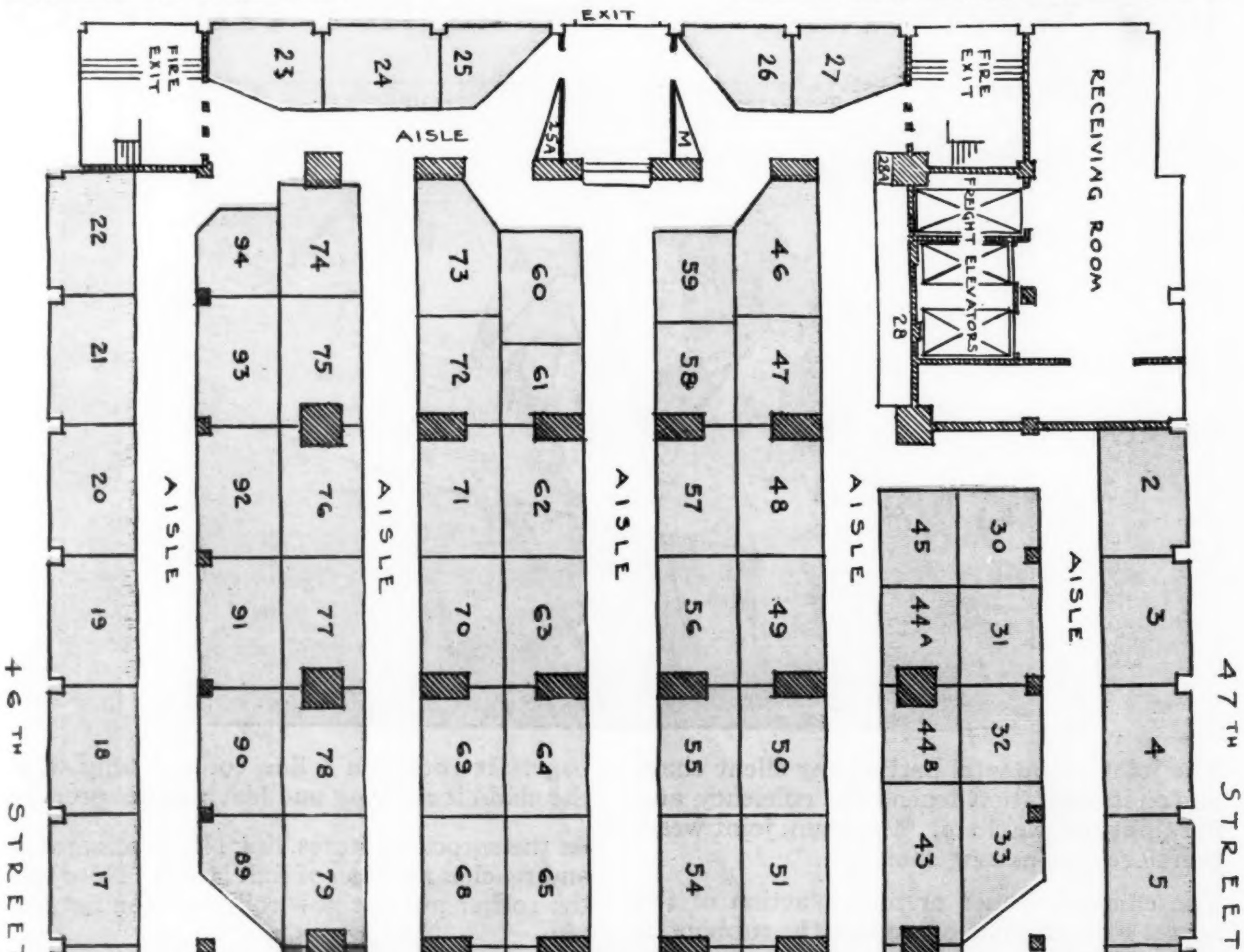
FIRST FLOOR BOOTHS NO. 2 to 101

Sixth National Exposition of Power and Mechanical Engineering

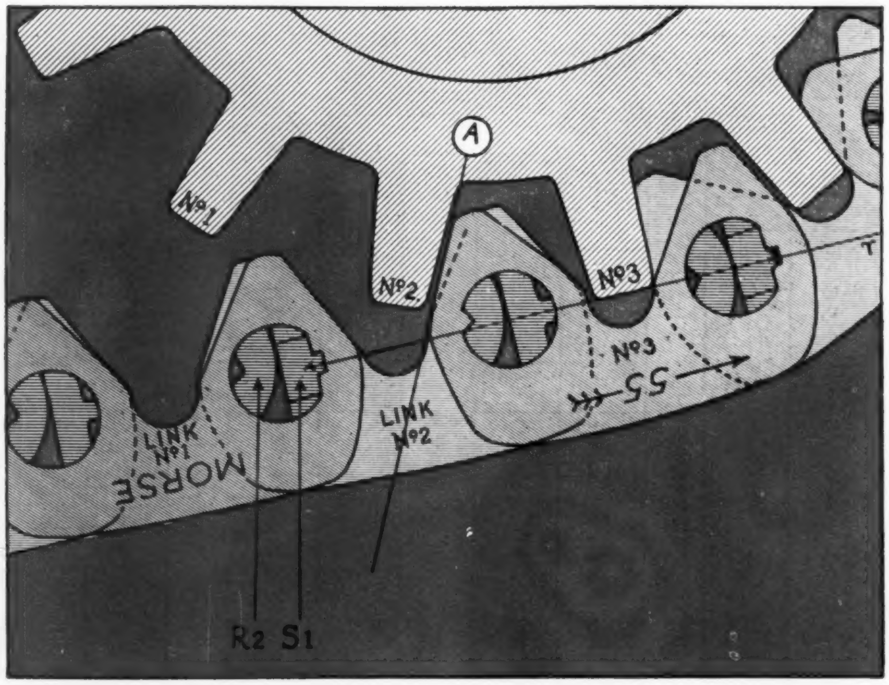
December 5th to 10th, 1927 **Grand Central Palace, New York, N. Y.**



See Pages 9-33 for Directory of Exhibitors *See Page 120 for Alphabetical List of Advertisers in this Section*

The MORSE Rocker Joint

less wear—longer life—higher efficiency



The joint is the vital part of any silent chain and on its operation depend the efficiency and durability of the chain. Minimum joint wear, therefore, means long chain life.

The efficient rocker or rolling action of the Morse Rocker Joint eliminates the rubbing or sliding friction commonly found in all round pin chains. Referring to the illustration above, link No. 1 is pulling on its flat faced seat pin, S_1, against rocker pin R_2 in link No. 2.

Note how the original Morse Rocker Joint Chain carries the load between sprockets on a broad, flat bearing surface between pins, thereby reducing wear and preventing slippage. It rocks on a line contact only when the chain is entering and leaving the sprocket.

As the sprocket rotates, link No. 2 rolls around and reaches position of link No. 3. Note that the rocker pin has now rolled on the flat seat pin.

This Rocker Joint action combines with good material and expert workmanship, to make the Morse Silent Chain, noted for its 98.6% sustained efficiency and long life.

Let a Morse Transmission Engineer show you how Morse Drives are serving practically every power transmission need.

MORSE CHAIN COMPANY, ITHACA, N. Y., U. S. A.

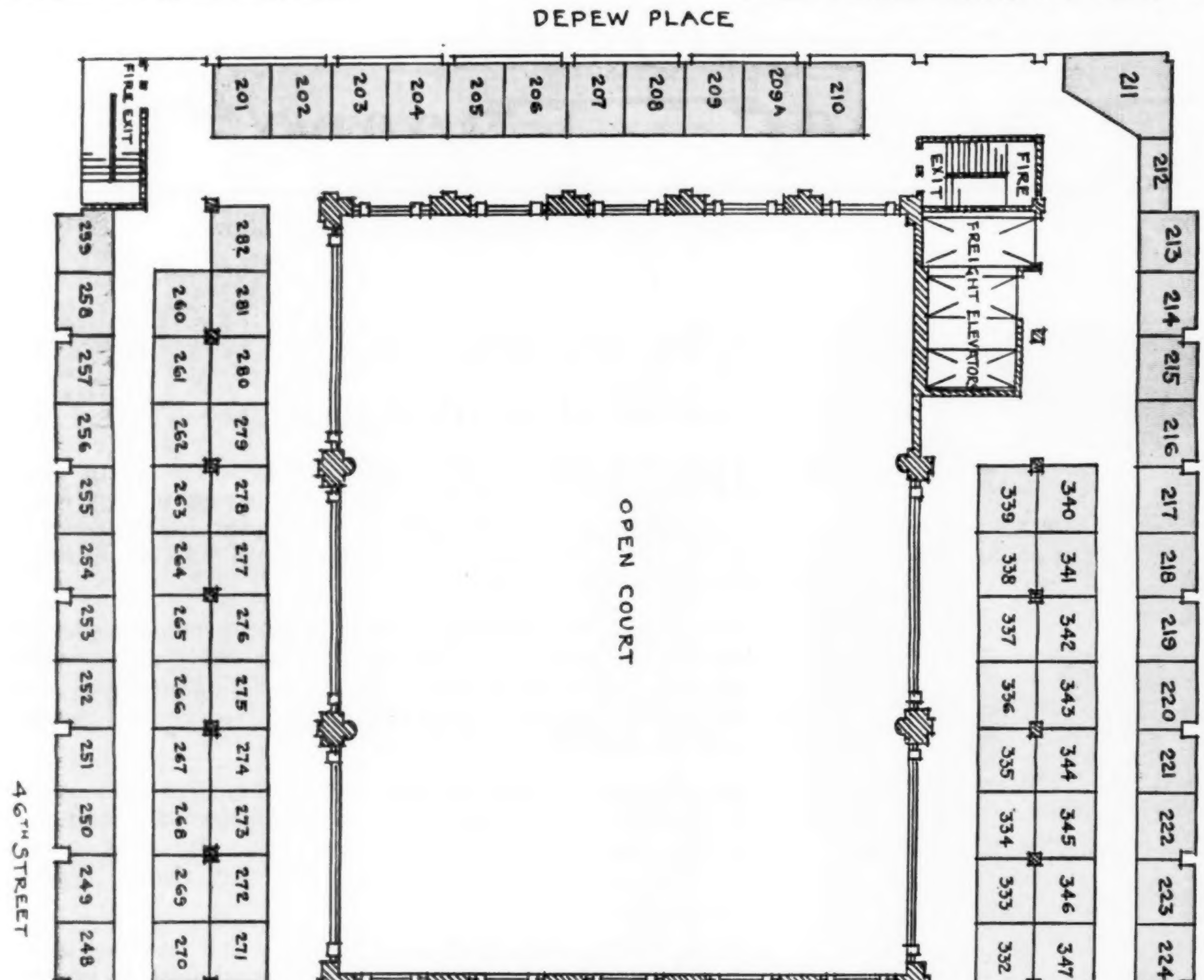
ATLANTA, GA. .... 702 Candler Bldg, Earl F. Scott & Co.
BALTIMORE, MD. .... 1002 Lexington Bldg.
BIRMINGHAM, ALA. .... Moore-Handley Hardware Co.
BOSTON, MASS. .... 141 Milk Street
BUFFALO, N. Y. .... Ellicott Square Bldg.
CHARLOTTE, N. C. .... 404 Commercial Bank Bldg.
CHICAGO ILL. .... 122 West Adams St.
CLEVELAND, OHIO .... 421 Engineers Bldg.
DENVER, COLO. .... 211 Ideal Bldg.
DETROIT, MICH. .... 7601 Central Avenue
LOUISVILLE, KY. .... 516 W. Main Street, E. D. Morton Co.
MINNEAPOLIS, MINN. .... 413 Third Ave., Strong-Scott Mfg. Co.
NEW ORLEANS, LA. .... Queen & Crescent Bldg., 334 Camp St., A. M. Lockett & Co., Ltd.
NEW YORK, N. Y. .... 50 Church Street
OMAHA, NEB. .... 923 W. O. W. Bldg., D H. Braymer Equipment Co.
PHILADELPHIA, PA. .... 20 South 15th St.
PITTSBURGH, PA. .... Westinghouse Bldg.
SAN FRANCISCO, CAL. .... Monadnock Bldg.
ST. LOUIS, MO. .... 2137 Railway Exchange Bldg.
TORONTO, 2, ONT., CAN. .... 50 Front St., E. Strong-Scott Mfg. Co.
WINNIPEG, MONTREAL, CAN. .... Dufferin St., Strong-Scott Mfg. Co.

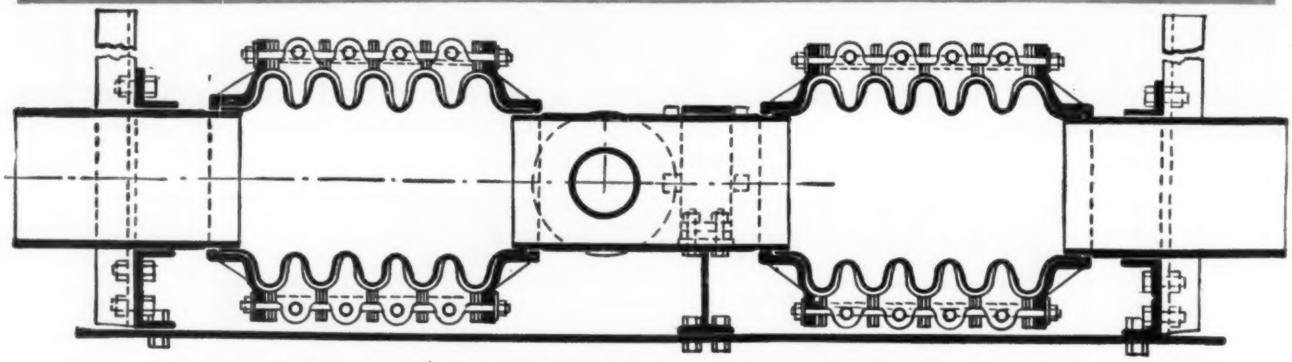
MORSE SILENT CHAIN DRIVES

SECOND FLOOR BOOTHS NO. 201 to 347

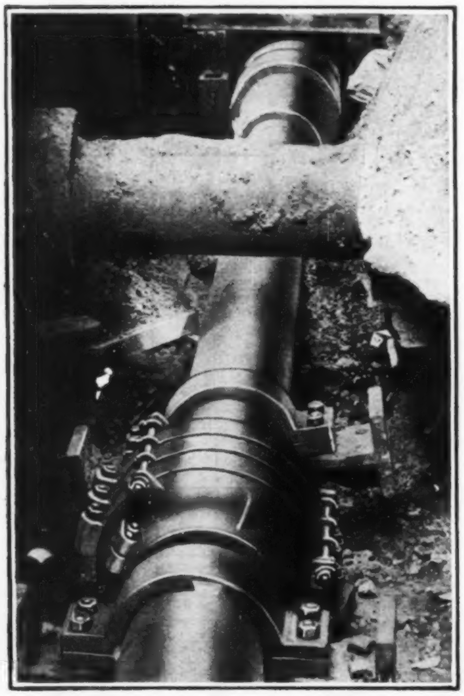
Sixth National Exposition of Power and Mechanical Engineering

December 5th to 10th, 1927 **Grand Central Palace, New York, N. Y.**





Badger Double Flangeless Self-Equalizing Expansion Joints With Structural Steel Anchor and Guides



The maximum flexibility for welded underground mains

BADGER Welding Self-Equalizing Expansion Joints make it possible to install underground steam or hot water mains with every joint welded. The open pipe ends can be welded into the line, down in the trench, like an ordinary straight length of pipe.

The continuous multi-corrugated copper expansion element permits the pipe to expand and contract freely and prevents injurious expansion stresses. It has no sliding members, stuffing box or packing. Leakage is eliminated and no maintenance is required.

The pipe line is easily kept in proper alignment by standard Badger guides, supported on brackets that are anchored in the trench walls or in concrete piers. By welding lugs to the pipe on each side of guide they may also be used as dependable anchors.

Badger Self-Equalizing Expansion Joints are also furnished in the flanged type. All sizes above 4 in. are guaranteed to 200 lb. pressure. *Write for Bulletin.*

Badger Engineering Service

Badger engineers are designers, manufacturers and installation experts for the following and kindred power plant products: Pipe Bends, Chemical Apparatus, Copper and Sheet Metal Work, Copper Boilers.

E. B. BADGER & SONS CO.

75 Pitts Street, Boston, Mass.

New York: 271 Madison Ave. **Tulsa, Okla.: Mid-Continent Bldg.**

Representatives in all principal cities

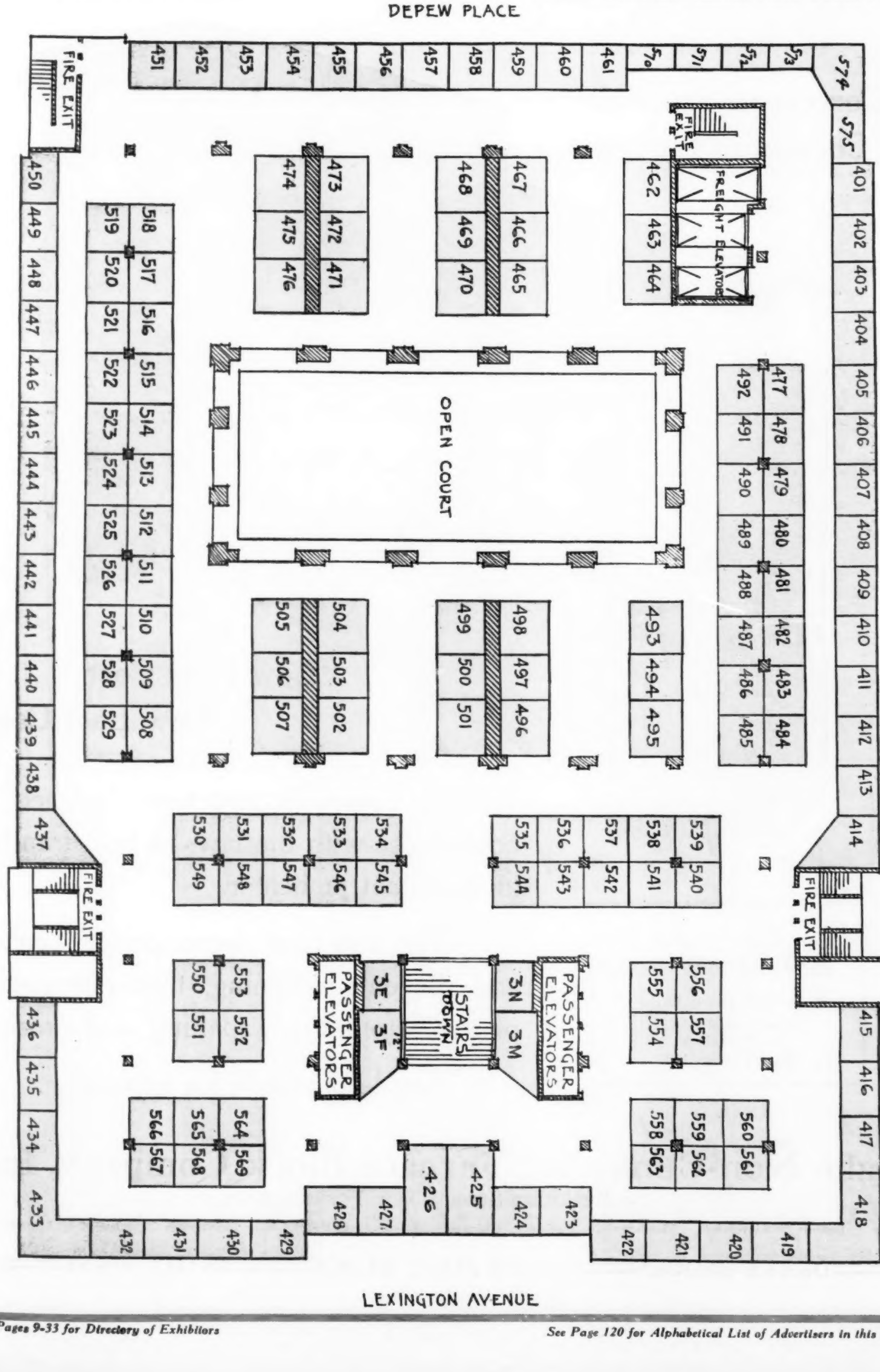
BADGER EXPANSION JOINTS

ESTABLISHED 1841 WEATHER VANE ON FANEUIL HALL TRADE MARK E.B. BADGER & SONS COMPANY

THIRD FLOOR BOOTHS NO. 401 to 569

Sixth National Exposition of Power and Mechanical Engineering

December 5th to 10th, 1927 **Grand Central Palace, New York, N. Y.**



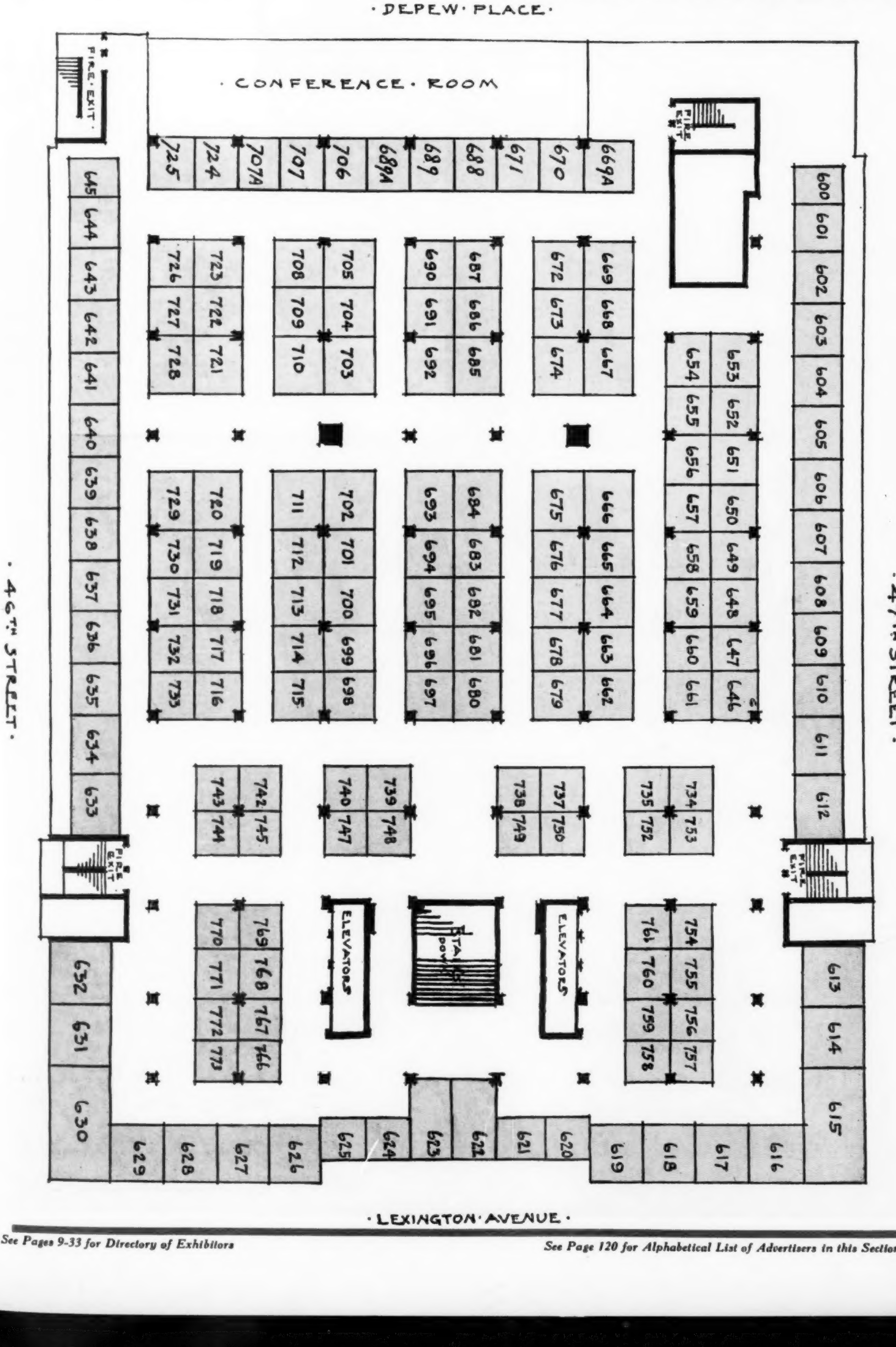
See Pages 9-33 for Directory of Exhibitors

See Page 120 for Alphabetical List of Advertisers in this Section

FOURTH FLOOR BOOTHS NO. 600 to 773

Sixth National Exposition of Power and Mechanical Engineering

December 5th to 10th, 1927 — **Grand Central Palace, New York, N. Y.**



Bailey Meters

64 of the 70 stations in operation or under construction in the United States and Canada, using the central preparation type of pulverized fuel systems as listed in the August, 1927 Report of the N.E.L.A. Prime Movers Committee on Pulverized Fuel, use Bailey Meters to guide the operators in efficient boiler control.

Pulverized Coal passes through a boiler furnace in a very few seconds so that the exact amount of air must be supplied each instant. The Air Flow Recorder of the Bailey Boiler Meter responds immediately to every change in the rate of air supply and shows whether the amount is correct for best combustion efficiency.

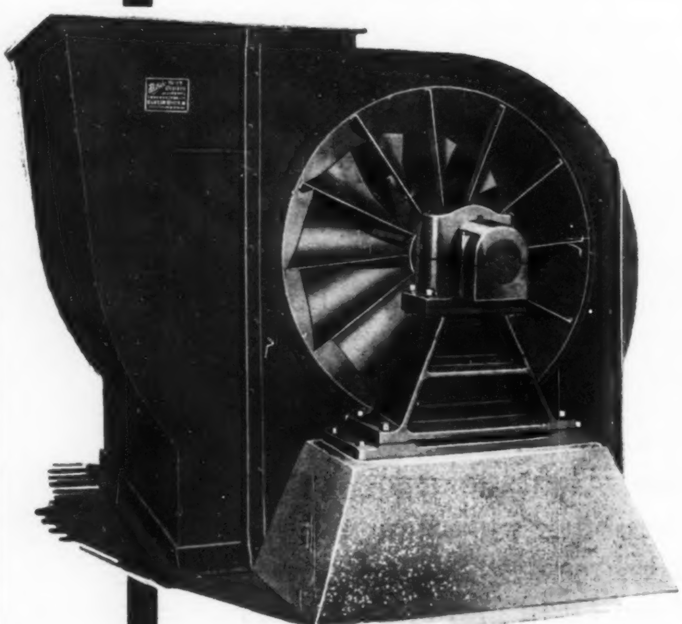
Bailey Meters record Steam Flow, Air Flow, Rate of Coal Feed, Flue Gas Temperature and other important factors. They also indicate Primary Air Pressure, Secondary Air Pressure, Furnace Draft, Up-Take Draft and other factors needed in boiler operation. This explains why Bailey Meter equipment is being selected for all important pulverized coal installations now going in.

Bulletins 43, 162 and 180 will be mailed upon request.

See the Bailey Meter Exhibit
Booth No. 51 at the New York Power Show

Co. 1026 IVANHOE ROAD CLEVELAND, O.

Paving the way Economy—



Wherever a new central station is erected, you'll find the latest and finest equipment for power generation being installed. That's because operating economies are far more important than the original cost of equipment. It also explains the preference displayed by the largest power companies for Buffalo forced and induced draft fans.

Buffalo fans installed ten years ago are still of comparatively modern design, and Buffalo fans built to-day give guaranteed efficiencies far beyond the ordinary.

Pave the way for real combustion economy in your plant by installing "Buffalo."

Branch engineering offices in all cities are at your disposal.

"Buffalo"

Visit our Exhibit

Mechanical

for Combustion

"Boiler Room of the Crawford Avenue Station, Commonwealth Edison Co. Buffalo Fans serve this plant as well as Calumet Station of the same company".

A few of the latest large stations where Buffalo Mechanical Draft Apparatus serves—

Tecumseh Station, Kansas Power & Light Co.
Philo Station, Ohio Power Co.
Twin Branch Station, Ohio Power Co.
Columbia Power Station, Columbia Power Co.
Hell Gate Station, United Electric Light & Power Co.
Avon Station, Cleveland Electric Illuminating Co.
Crawford Avenue Station, Commonwealth Edison Co.
Calumet Station, Commonwealth Edison Co.
Kearny Station, Public Service Power Co.
Ford Motor Co. many plants
Northwest Station, Commonwealth Edison Co.
Northern States Power Co. St. Paul, Minn.
San Angelo Power Station, West Texas Utilities Co.
Illinois Northern Utilities Co.
Connors Creek, Delray, Marysville, and other plants of the Detroit Edison Co.
Ohio University Power Plant
Northwest Station, Commonwealth Edison Co.
Trenton Channel Station, Detroit Edison Co.
—and hundreds of others.

Catalog No. 730 shows much of the equipment installed in these plants. Write for it.

Buffalo Forge Company

148 Mortimer St. Buffalo, N. Y.

In Canada: Canadian Blower & Forge Co., Kitchener, Ont.

at the Power Show Space 73.

Draft Apparatus

Detroit Suc

based on

Level fuel bed
Mechanical drive
Individual control

of fuel feed and distribution
in each retort

Correct Application · Sound Design · Superior Construction

DETROIT STOKER COMPANY
928 General Motors Building
DETROIT · MICHIGAN

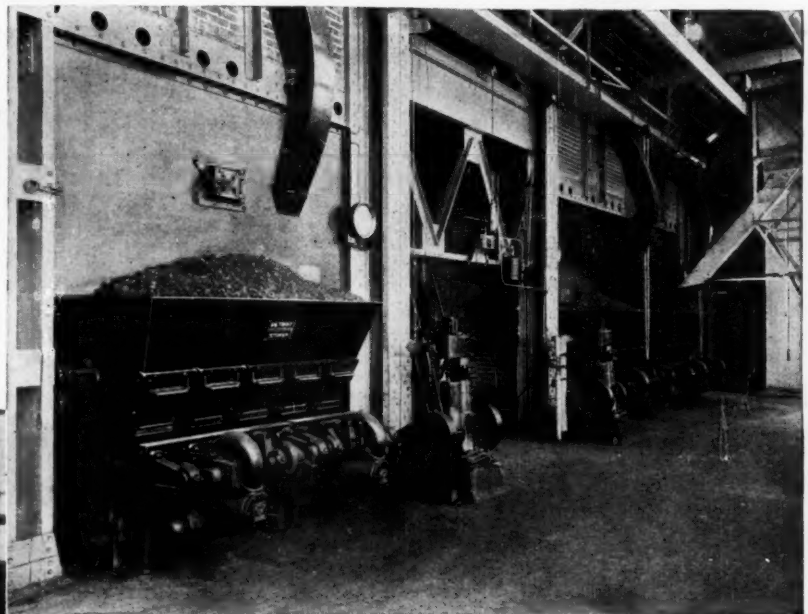
Made in Canada at St. Catharines, Ontario

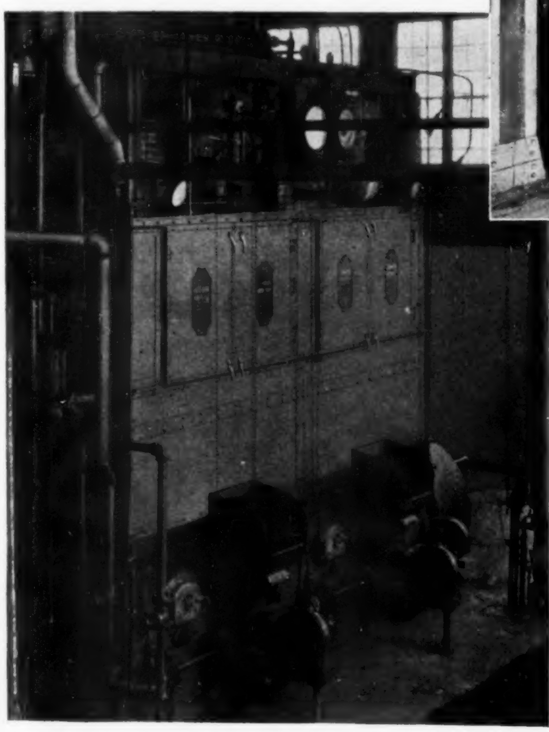
DETROIT

CESS

See them work!

N.Y. Power Show
Dec. 5-10
SPACES 203·4·5





For Every Service

Multiple retort rear cleaning stokers for large boilers and heavy steam requirements.

Double retort side cleaning stokers for medium boilers.

Single retort side cleaning stokers for small to medium boilers of 100 to 300 H. P. each.

Detroit UniStoker—compact, self-contained stoker independently operated—from 30 to 300 H. P.

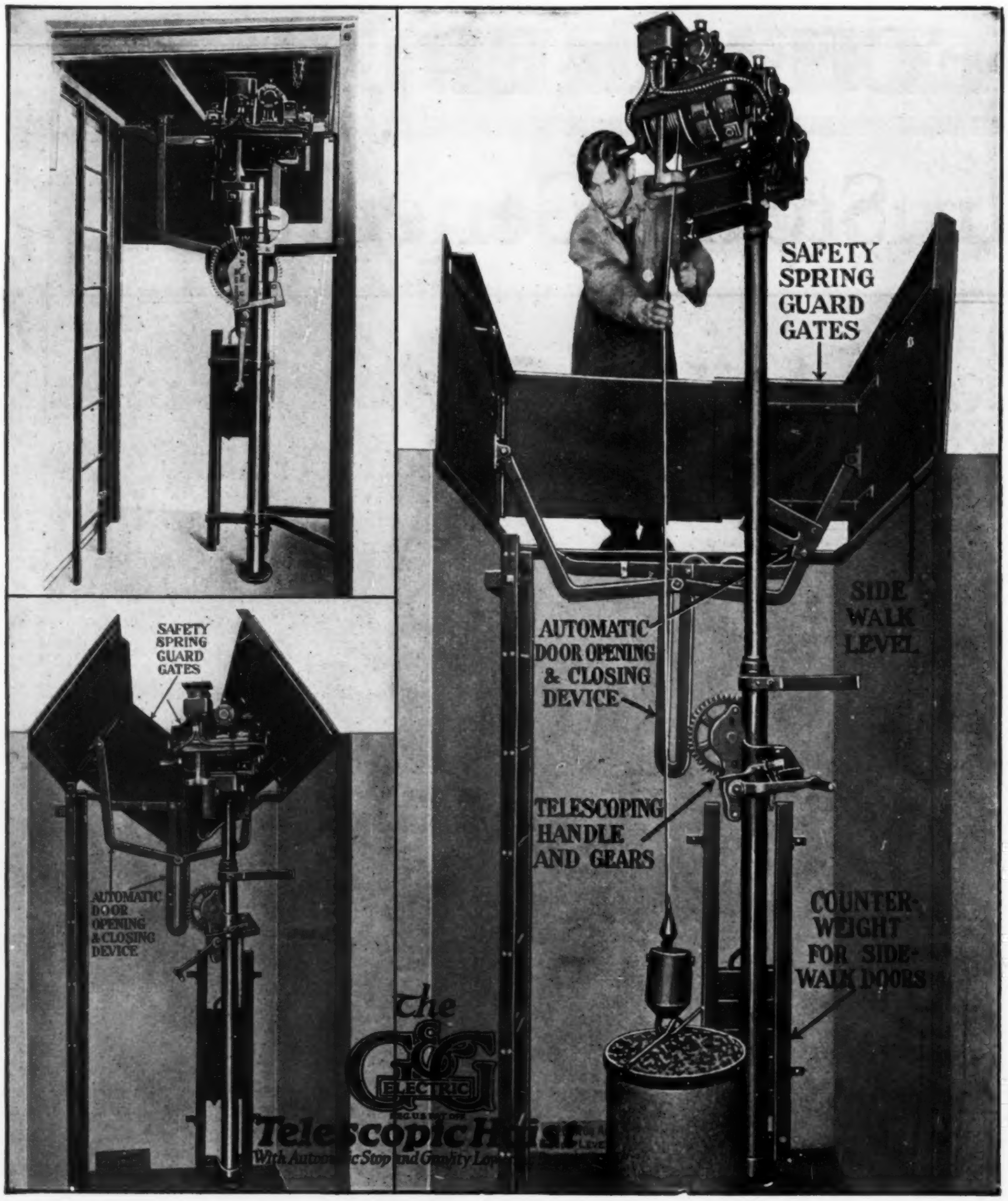
Industrial stokers for dryers, heating furnaces, etc.

For description of all types and sizes of Detroit Stokers, ask for Bulletin 930.

DETROIT STOKER COMPANY
928 General Motors Building
DETROIT · MICHIGAN

UNDERFEED STOKERS

BOOTHS 86-8—NEW YORK POWER SHOW—DEC. 5 to 10



Labor Saving, Safe, Speedy Ash Removal

SINCE 1866

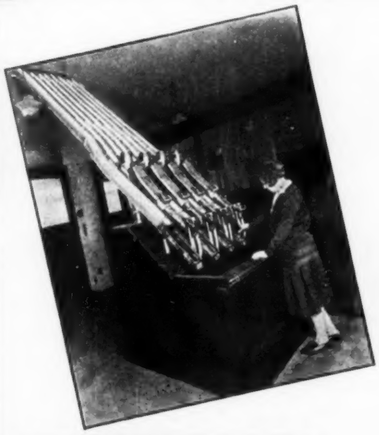
Over Sixty Years of Service to the ARCHITECTURAL PROFESSION

OUR display at the Power Show will exhibit all models of G&G Telescopic Hoists. The electrically operated ones will be installed under the same conditions as would exist in a building. Ask our engineers for information, or if you are unable to attend, write us for literature.

GILLIS & GEOGHEGAN

521 West Broadway, New York

The G&G ATLAS PNEUMATIC TUBE SYSTEM



At left—PARKE-DAVIS CO., DETROIT, Smith, Hinchman & Grylls, Architects. The manufacture and shipment of pharmaceutical products is made more efficient by use of Mechanical Messengers.

At right—SEARS, ROEBUCK & CO., ATLANTA, GA. Efficient execution of orders in mail order houses is based upon efficient Mechanical Messenger service. Martin C. Schwab, Chicago, Architect.

MECHANICAL MESSENGERS
ARE FASTER and MORE DEPENDABLE THAN HUMAN MESSENGERS

USERS of G&G Atlas Mechanical Messenger Service include many of the best known names of institutions and establishments on this continent. This recognition of merit is not accidental. After painstaking study and comparison many leaders in their respective industries have chosen G&G Atlas Mechanical Messengers because they found dependable, distinctive and exclusive features.

If you have correspondence, charge slips, small articles, etc., to be quickly, silently, unobtrusively transferred from point to point in your building, you, too, can save money, time and avoid annoyance by using this modern system of messenger service.

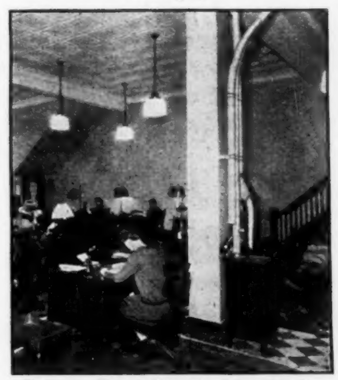
Comprehensive Catalog on request.

G&G ATLAS SYSTEMS
INCORPORATED
521 West Broadway, New York
Dominion Bank Bldg., Toronto, Canada

THE FLEISCHMANN COMPANY, yeast and vinegar manufacturers, NEW YORK, Louis Tieman, Architect.

THE WORLD, NEW YORK. Newspapers speed publication by using Mechanical Messengers.

STONE & WEBSTER, BOSTON, have eight 3"x6" lines for sending documents between departments.



BROOKLYN EDISON CO., BROOKLYN, N. Y., Public Service Corporations use Mechanical Messenger Service for greater efficiency.

THE STEVENS HOTEL, CHICAGO, Holabird & Roche, Architects. In the World's Greatest Hotel every department is connected with the Management by Mechanical Messengers.

THE BANK OF MONTREAL (the oldest bank in British North America) and others save time and prevent errors through the use of Mechanical Messengers.

23 Years *of*

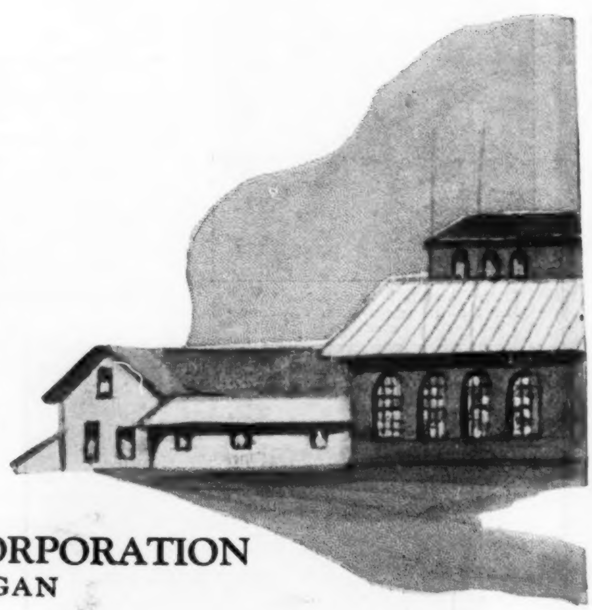
A SINGLE idea has dominated the thoughts and actions of the Diamond Organization for 23 years. That idea has been to perfect means for economical removal of efficiency-destroying soot deposits from the heating surfaces of the steam boiler.

No other line of work has ever been permitted to claim the attention of the organization. Its efforts to improve boiler operating conditions, to develop improved equipment based on analysis and research in well organized research departments and laboratories, have been unceasing.

The results speak for themselves. Diamond has been responsible for such outstanding developments as:

- Automatic Valved, "Valv-in-Head," Blower Heads
- Calorized Seamless Blower Elements
- Dialoy Seamless Blower Elements
- Blower Elements for Slag Removal
- Turbine Type Nozzles
- Nozzles, Internally Electro-Welded
- Rolled Blower Element Ends
- Steel Bearings
- Means for Control of Blowing Arcs
- Means for Control of Velocity of Steam Jets
- Means for Quick or Slow Valve Opening to Protect Baffles and Brickwork
- Full Floating Mechanism for Soot Blower Heads
- Automatic, Electrically Controlled and Operated Soot Blower Systems.

The comparison of the above list with the component parts of a modern soot blower system points to the inevitable conclusion that modern soot blower design and construction is Diamond design and construction; modern soot blower practice is Diamond practice.

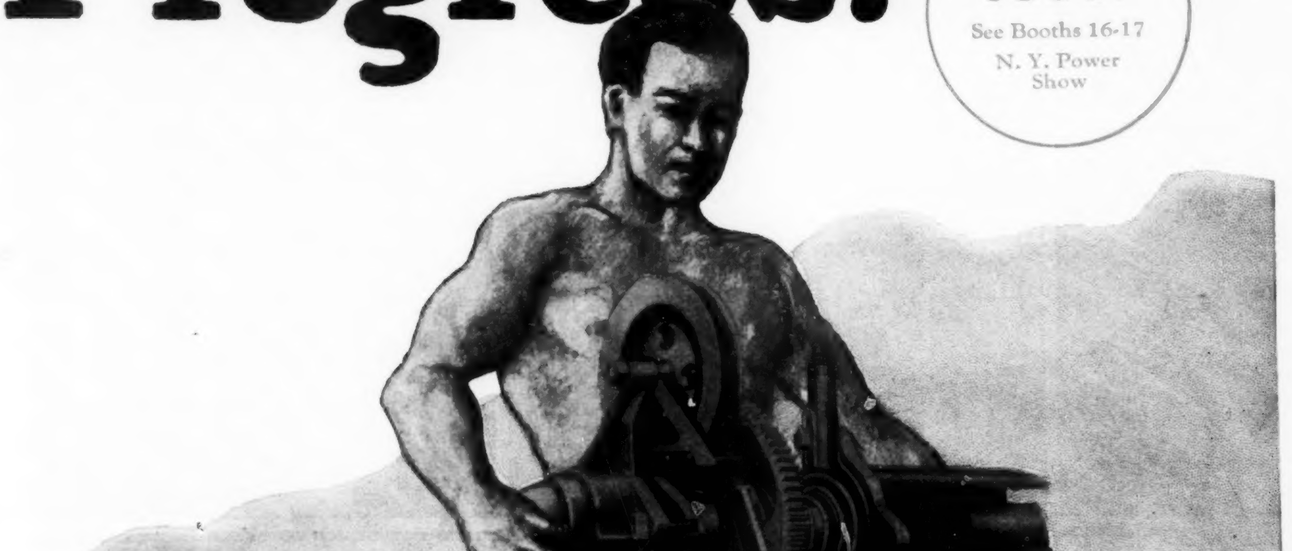


DIAMOND POWER SPECIALTY CORPORATION
DETROIT • • MICHIGAN

Diamond *Automatic*

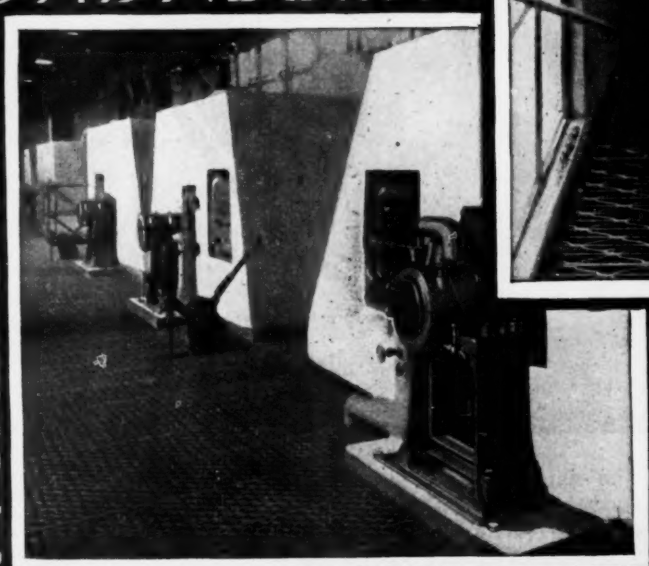
Soot Blower Progress!

What Price SOOT?
See Booths 16-17
N. Y. Power Show



Valved Soot Blowers

-plus-

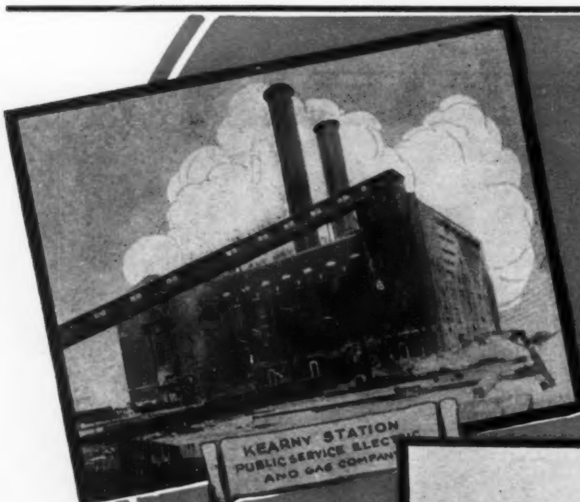


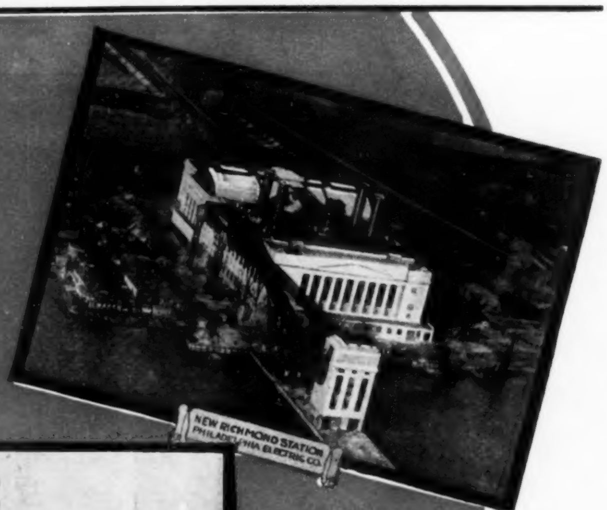
OPEN STEEL
IRVING
SUBWAY
TRADE MARK REGISTERED
FLOORING

P-176

BOOTH 16—NEW YORK POWER SHOW—DEC. 5 to 10

Typical Kellogg Piping Installations





More than ten years ago, Kelloggs' engineers began designing and testing piping, receivers, etc., for 400, 650 and 1200 lbs. at 700 to 950 deg., knowing that pressures never would be confined to 250 lbs. Kellogg was the pioneer.

So successful were they, that today, Kellogg high pressure piping is installed in America's leading plants. Herewith are three typical Kellogg Piping Installations.

The experience of our engineers gained with the stations shown on this page alone, probably is sufficient to settle any possible questions about which you are in doubt.

Kellogg Forged Welded equipment is built to conform to the A.S.M.E. Boiler Code and is insurable just as your boilers are insurable.

If you are planning a piping job—show your layout to our engineers—No obligation.

M. W. KELLOGG CO., 7 DEY ST., NEW YORK

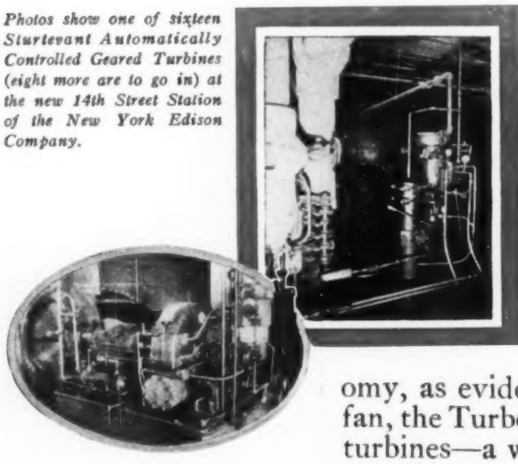
We carry a complete stock of extra heavy iron pipe seamless steel tubing at our plant in Jersey City in sizes from 3 in. to 14 in. inclusive

KELLOGG

FORGE WELDED PIPE
FORGE WELDED CONTAINERS
POWER PLANT PIPING

All Kellogg Forge Welded Products are Insurable

4 Engineering Triumphs



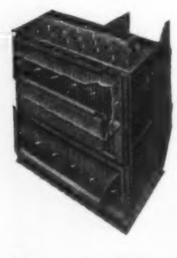
Photos show one of sixteen Sturtevant Automatically Controlled Geared Turbines (eight more are to go in) at the new 14th Street Station of the New York Edison Company.

FOR sixty years the name Sturtevant has been associated with constructive progress in power plant equipment. Sturtevant engineers have developed reliable apparatus that have been important factors in the efficient operation of a vast number of power plants throughout the world. In many of the outstanding great central stations—and graduating down to the small industrial boiler rooms—Sturtevant products are instrumental in reducing steam cost to the minimum.

Four recent contributions to steam generating progress, destined to have far-reaching effects in operating economy, as evidenced by successful installations, are a new induced draft fan, the Turbovane, Type I.D.—an automatic control of auxiliary steam turbines—a water economizer with lead coated extended surface steel tubes—and an air economizer with removable, reversible chambers—each an engineering triumph.

The Sturtevant Automatically Controlled Steam Turbine with reduction gear transmission is particularly adapted for auxiliary drive in plants with frequent fluctuations in steam supply. Initial installations demonstrate its important advantages over hand operated turbines, and point to its wide adoption by the most efficiently operated power plants.

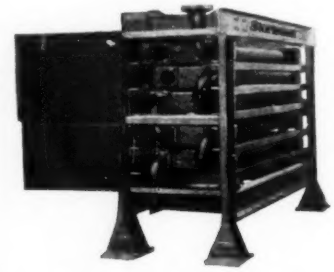
A master controller for the station regulates an hydraulic relay cylinder, which through cams opens and closes each valve of the six to ten separate nozzles of the turbine. When closed, the valve is tight. The nozzles can be adopted to the power characteristics of each installation.



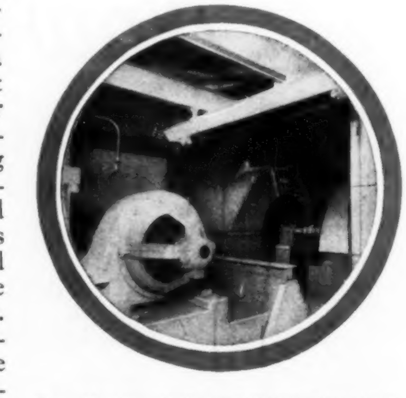
Sturtevant Air Economizers employ the counter current principle in efficiently transferring the heat in flue gases to preheat combustion air—improving combustion, saving fuel and increasing capacity.

An exclusive feature is the removable, reversible chambers—practically doubling the life of service.

Sturtevant Water Economizers, designed for the higher pressures in present day steam generation, have steel tubes with steel discs integral with the pipes. The tubes are lead coated inside and outside to prevent corrosion by sulphuric acid in gases and oxygen in water.



Sturtevant Turbovane I.D. is developed for direct connection to motors or turbines. It is of the high efficiency type, operating at comparatively high speed. It has a self-limiting horse power characteristic, which permits the use of a small driving unit and prevents over load. Draft is regulated by tilting vanes in the fan inlet. The narrow and rugged impeller is bladed with curved floats radial at the tip and self-cleaning. Bearings are especially designed. The fan can easily be installed by removing a straight flue section.



One of 4 automatically controlled Turbovane I.D. fans in Edgar Station, Edison Elect. Ill. Co., Boston, at Weymouth, Mass. Eight other Sturtevant Mechanical Draft fans are also installed here.

See these machines and other Sturtevant Power Saving Devices at the New York Power Show—Grand Central Palace, New York City—Dec. 5-10.

B. F. STURTEVANT COMPANY, HYDE PARK, BOSTON, MASS.

ATLANTA BOSTON BUFFALO CAMDEN CHICAGO CHARLOTTE CINCINNATI CLEVELAND DALLAS DENVER DETROIT HARTFORD INDIANAPOLIS KANSAS CITY LOS ANGELES MINNEAPOLIS MONTREAL NEW YORK CITY PITTSBURGH PORTLAND ROCHESTER ST. LOUIS SAN FRANCISCO SEATTLE TORONTO WASHINGTON

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BERKELEY, CALIF. CAMDEN, N. J. FRAMINGHAM, MASS. GALT, ONTARIO HYDE PARK MASS. STURTEVANT, WIS.

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1757

Sturtevant

(REG. U.S. PAT. OFF.)

Not One Brick Replaced

HYTEMPITE continues to give excellent service at the Devon plant of the Connecticut Light & Power Company, just as it does at many others all over the country.

We quote what was said about Boiler No. 3, shown in the small picture:

"This boiler has been in service 246 days, or 5904 hours. During this period there has been no expenditure for maintenance—not even a brick has been replaced in the setting."

The Devon plant is modern in every respect and was designed by engineers who know and demand the best materials. They specify HYTEMPITE in furnace construction.

If you have furnace construction or repair problems, either large or small, it will pay you to investigate HYTEMPITE.

HYTEMPITE
(Reg. U. S. Pat. Off.)

is a High Temperature Cement manufactured exclusively by the Quigley Furnace Specialties Company. Stock and Service in every large Industrial Center.

**Quigley
Furnace Specialties Co., Inc.
26 Cortlandt St., New York**

See Our Exhibit at the New York Power Show, Booth 89

What is the Thermix Air Heater?

It utilizes waste heat from flue gas, to heat air for drying or preheat purposes.

Can I see one at the Power Show?

Yes—4th floor—Booth 656.

What's it like?

The Thermix is a plate type indirect heat exchanger placed between the boiler and the stack so that the waste flue gas passes along one side of each plate and gives up its heat to air passing on the other side. Pure, clean, heated air is thus obtained at practically no operating cost except that of driving the fans. It is, therefore, an apparatus for heat reclamation.

Preheating Air for Boilers—The Thermix preheats air for boilers with flue gas, thus saving heat that otherwise would be lost up the stack. Fuel saving and improved combustion conditions result.

Heating Air for Dryers—Industrial plants such as textile, paper mills, flour mills, etc., require large quantities of pure heated air for dryers. The Thermix replaces the usual steam coil and the heat is supplied practically without operating cost.

Heating Air for Air Conditioning—Dye plants, textile works, paper mills, and many other industrial plants are frequently troubled by formation of mists during the winter. The Thermix supplies the necessary heated air for removal of these mists. Our engineering staff is equipped to handle the entire installation.

Preheating Air for Oil Stills—The Thermix is in operation on oil stills at comparatively high temperatures and returns heat units to the furnace, thus effecting important fuel savings.

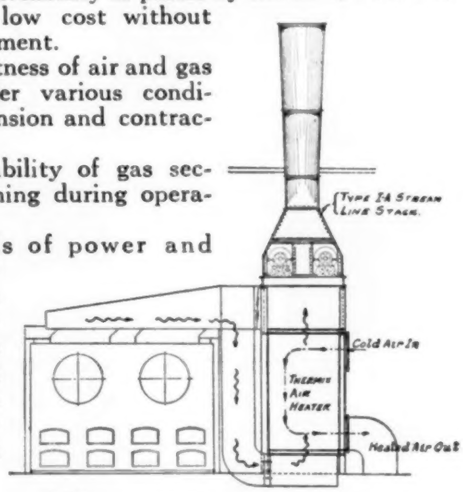
The plates are spaced to form air and gas passages using the countercurrent flow. The spacers consist of steel frames along the edges of the passages. By the use of special steel spirals under lateral compression, tightness is obtained and welding and riveting is entirely avoided. The advantages are:

(1) Replaceability of plates by the user, with mill material at low cost without special equipment.

(2) Tightness of air and gas sections under various conditions of expansion and contraction.

(3) Availability of gas section for cleaning during operation.

Hundreds of power and industrial plants use Thermix Air Heaters. The total heating surface in service is over two million square feet.

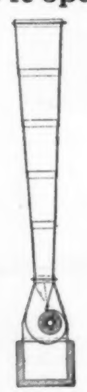


How about this Stream Line Stack?

It's a better form of induced draft—looks familiar but the inside workings are new.

What's that like?

See it operating at the Power Show.

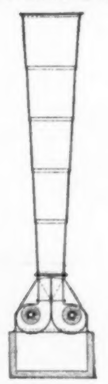


Type I

For drafts over 1.5 in.

Fan handling all of the gases and within stack, as a unit.

Features: High mechanical efficiency, low power cost.



Type I-A

For drafts over 1.5 in.

Two fans, handling all of the gases and within stack, as a unit.

Features: High mechanical efficiency, low power cost.

Type III

For drafts less than 1.5 in.

Interior gas fan handling portion of gas and ejecting remainder.

Feature: Low installation cost.

The Stream Line Stack is a combination, in a single unit, of a mechanical draft fan and a stack. It is inexpensive in first cost and operation. It uses less power than usual types of induced draft due to the reduction in bends, turns and changes of section. Compact, it may be placed at a level with the top of your boiler. This saves stack material from the ground to this level and eliminates unnecessary breeching. Several thousand Stream Line Stacks are in successful operation.

Write for Catalogs.

Prat-Daniel Corporation

101 Park Ave., New York, N. Y.

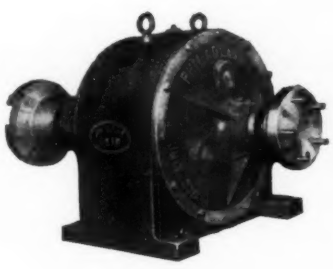
Representatives in Principal Cities

Manufactured and sold in Canada by Riley Engineering & Supply Co., Ltd., 360 Dufferin St., Toronto.

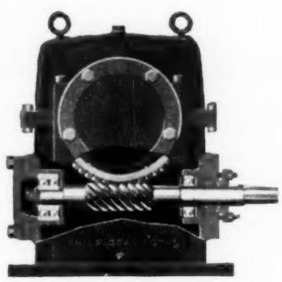
Low Cost Speed Reduction

is assured by the use of

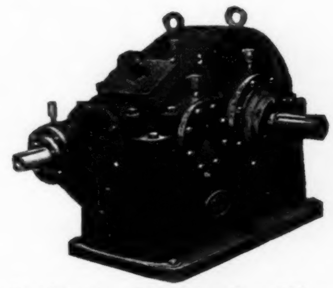
Philadelphia SPEED REDUCING UNITS



Syur Gear Reducer
Type M-2



Worm Gear Reducer
Type A.A & A.X.



Combination Spiral-Bevel and Herringbone Reducer Type B. H. B.

Come to Booth No. 10

It is a well known fact, that "no one type" of Speed Reduction Unit is best suited for every industrial requirement. Realizing this (from our gear and power transmission experience of nearly 50 years) we are in a position to offer Industry EVERY type of gear driven Speed Reducer,—for all HORSE-POWERS (up to 250), and in all RATIOS.

We suggest that you see our Exhibit at the Power Show, or,—send for our Catalog.

PHILLIE GEAR

Power Saving Products

GEARS: Spur, Worm, Herringbone, Internal, Bevel, Miter, Intermittent, Spiral, Helical.

NON-METALLIC PINIONS: Fabroil, Textolite, Celeron, Rawhide.

Whitney Silent and Roller Chains. Sprockets, Flexible Couplings, Universal Joints, Racks, Ratchets and Pawls.

—and a complete line of gear driven *Speed Reducers.*

Member of AGMA

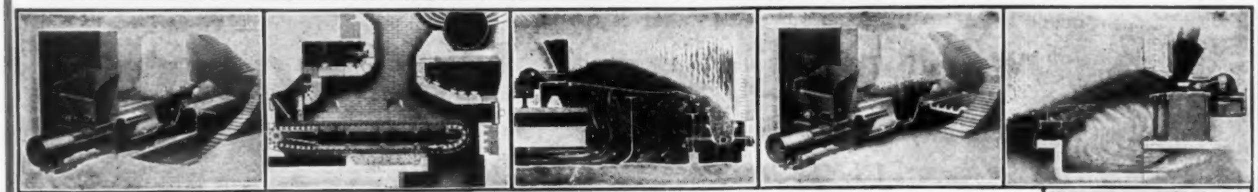
Main Office and Plant Erie Ave. and G St. Phila., Pa.

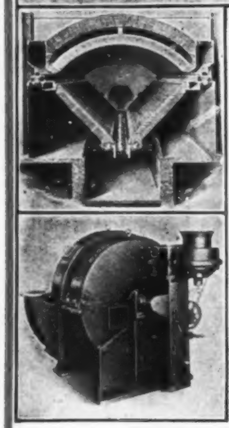
PHILADELPHIA GEAR WORKS

Manufacturers of Industrial Gears and Speed Reducing Units

PHILADELPHIA, PENNA.

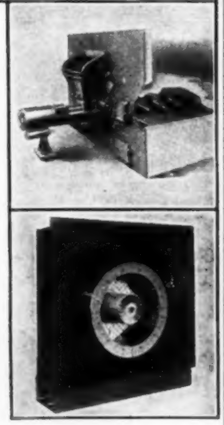
Branch Sales and Engineering Office: 12 E. 41st St., New York





The Greatest Exhibit of RILEY EQUIPMENT

Booths 78 and 79 New York Power Show



New Riley Super-Stoker

Unique, effective air zoning of the entire grate surface, improved grate construction, larger and deeper clinker grinder pit and many other improvements make the new Riley Super-Stoker a leader in its class. It is an entirely new stoker, the greatest Riley Stoker ever developed. An 11′-3″ long stoker, that we believe to be the biggest stoker ever exhibited at a power show, will be on display.

Improved Riley Atrita Unit Pulverizer

During the past year many improvements have been made to the Riley Atrita Unit Pulverizer. Notable among these is the improvement in peg construction. With the new rugged construction greater reliability and lower maintenance are obtained without in any way sacrificing the tremendous advantage of low power consumption, sustained fineness and ability to handle wet coals.

Riley Flare Type Burner

The Riley Flare Type Burner is giving unusual results. When used in connection with the Riley Atrita Unit Pulverizer a fuel range of 10 to 1 can be obtained. The burner is particularly easy to light. A soft, mellow, uniform flame is obtained.

New Jones Stoker Unit

For the smaller boiler installation, the New Jones Stoker Unit is very popular. It is a very compact unit, the fan and stoker being operated from the same motor, located under the stoker feeding mechanism. Jones Side Dump Stokers of this type are equipped with air zoning dampers which results in unusual flexibility.

Riley Stoker Corporation

RILEY STOKER CORPORATION

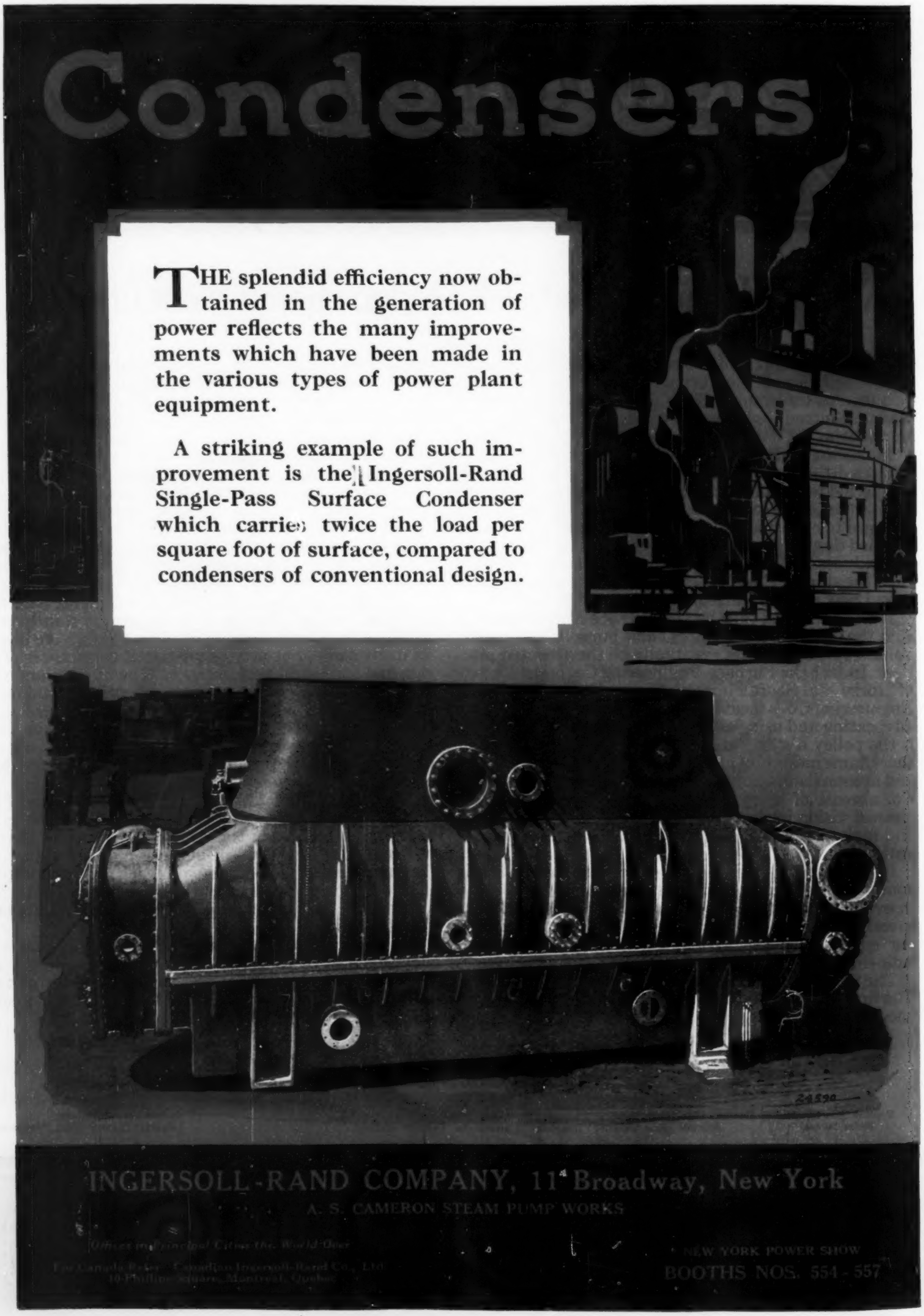
9 Neponset Street, WORCESTER, MASS., U. S. A.

"RILEY" Underfeed Stokers — *"JONES" Underfeed Stokers* — *"HARRINGTON" Traveling Grate Stokers*

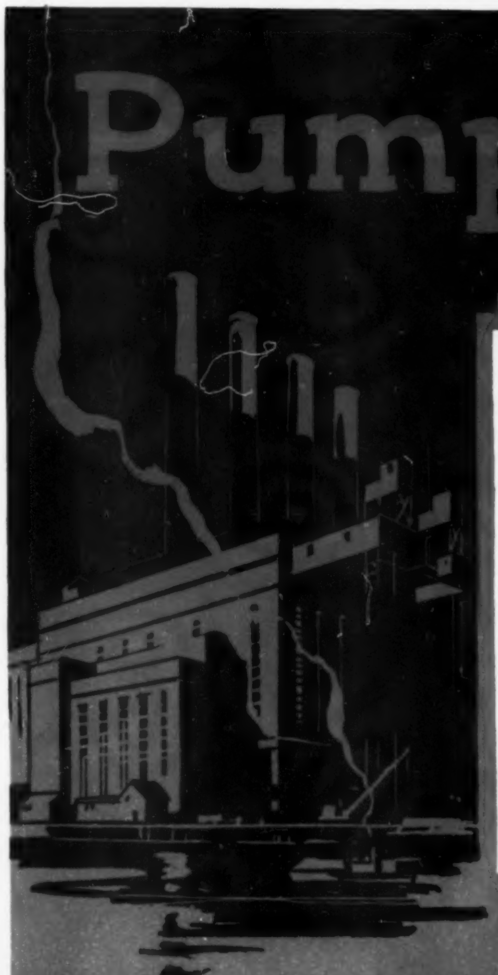
"MURPHY" Automatic Furnaces — *Pulverized Coal Installations*

BOSTON NEW YORK PHILADELPHIA PITTSBURGH BUFFALO CLEVELAND DETROIT SEATTLE CINCINNATI CHICAGO ST. PAUL KANSAS CITY DENVER CHARLOTTE DALLAS HOUSTON NEW ORLEANS

Riley Engineering and Supply Co., Ltd., Toronto — Riley Stoker Co., Ltd., London

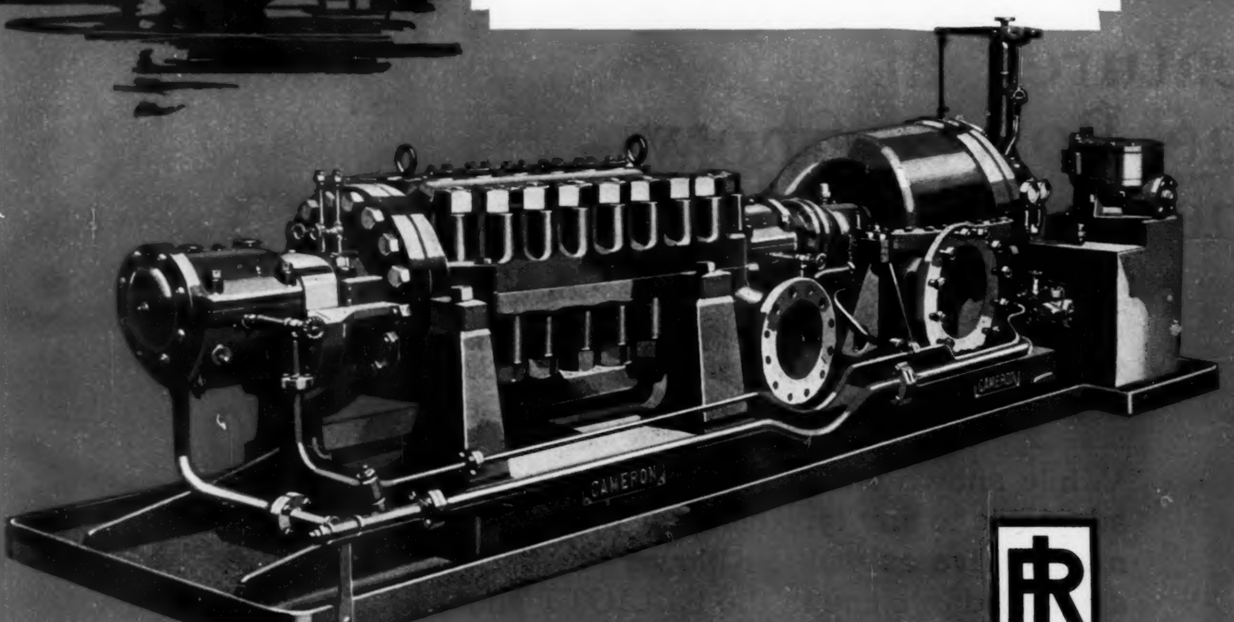

Condensers
THE splendid efficiency now obtained in the generation of power reflects the many improvements which have been made in the various types of power plant equipment.
A striking example of such improvement is the Ingersoll-Rand Single-Pass Surface Condenser which carries twice the load per square foot of surface, compared to condensers of conventional design.
INGERSOLL-RAND COMPANY, 11 Broadway, New York
A. S. CAMERON STEAM PUMP WORKS
Offices in Principal Cities the World Over
For Canada Refer—Canadian Ingersoll-Rand Co., Ltd.
10 Phillips Square, Montreal, Quebec
NEW YORK POWER SHOW
BOOTHS NOS. 554 - 557

Pumps



IN PUMPING equipment, as well as in condensers, Ingersoll-Rand and Cameron keep pace with or anticipate the requirements of the most modern power plant developments.

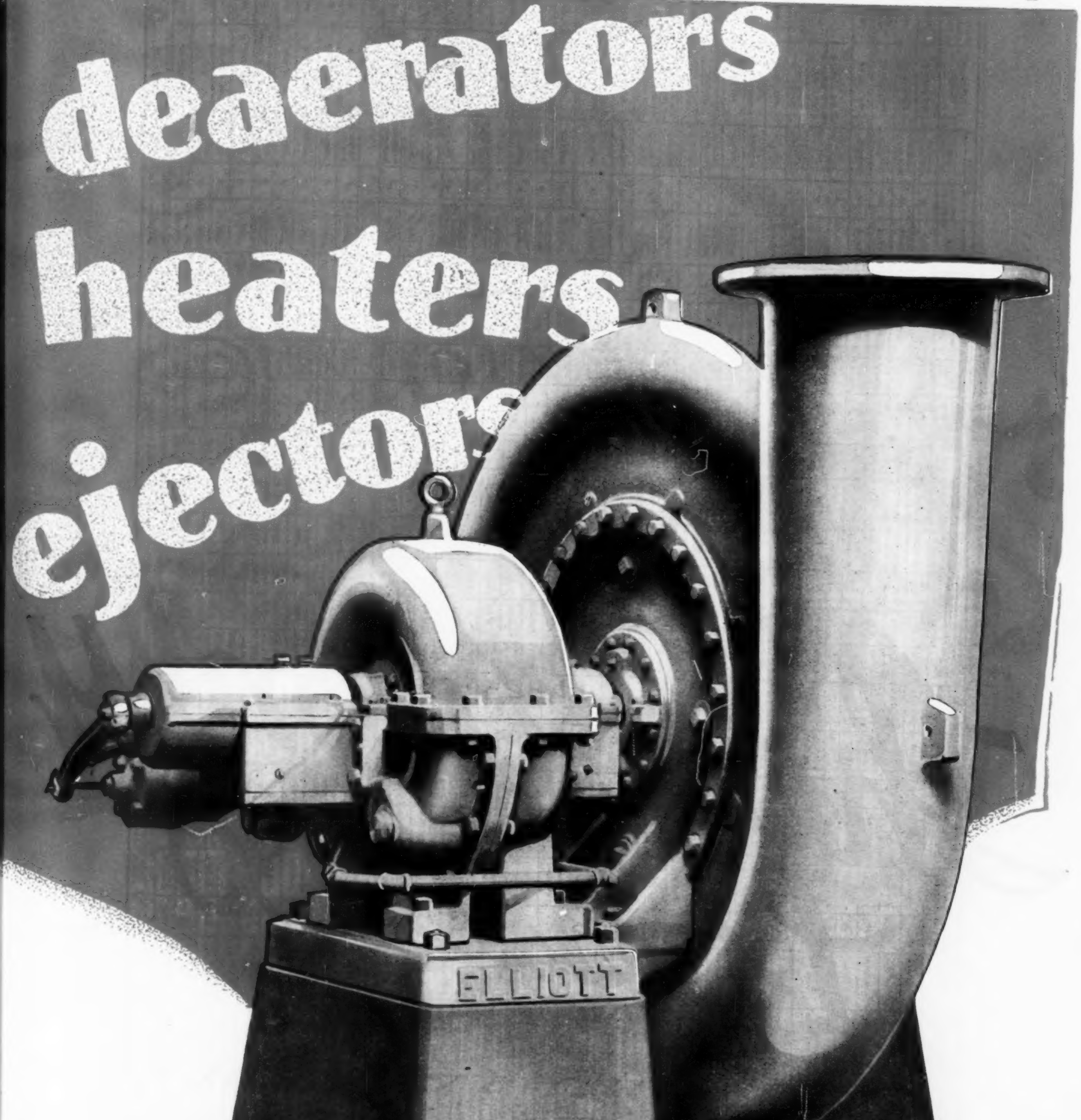
Cameron's latest product, the Class "HT" pump shown below, is the most powerful centrifugal pump ever made for boiler feeding. It sets a new standard for this type of service.

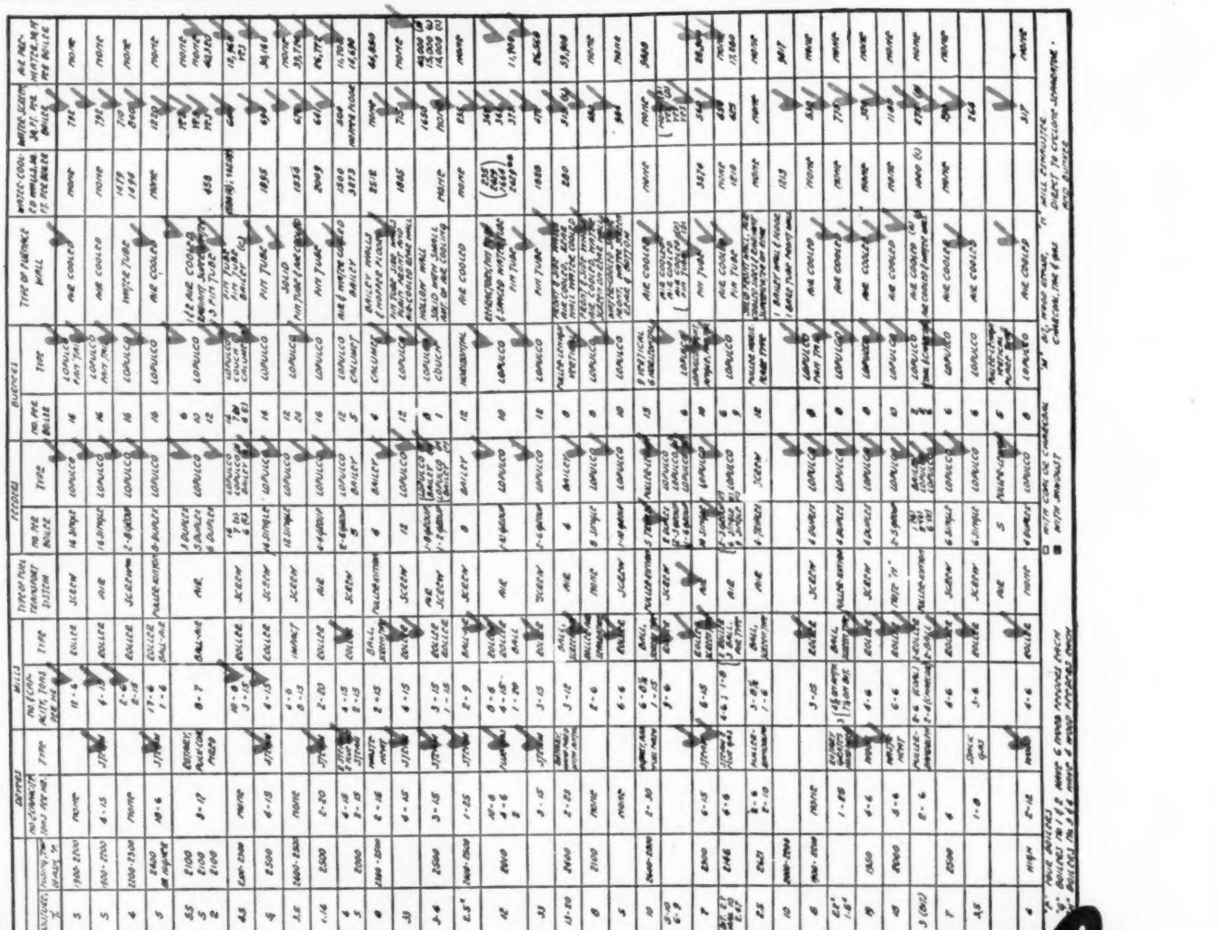


Ingersoll-Rand

R-1556

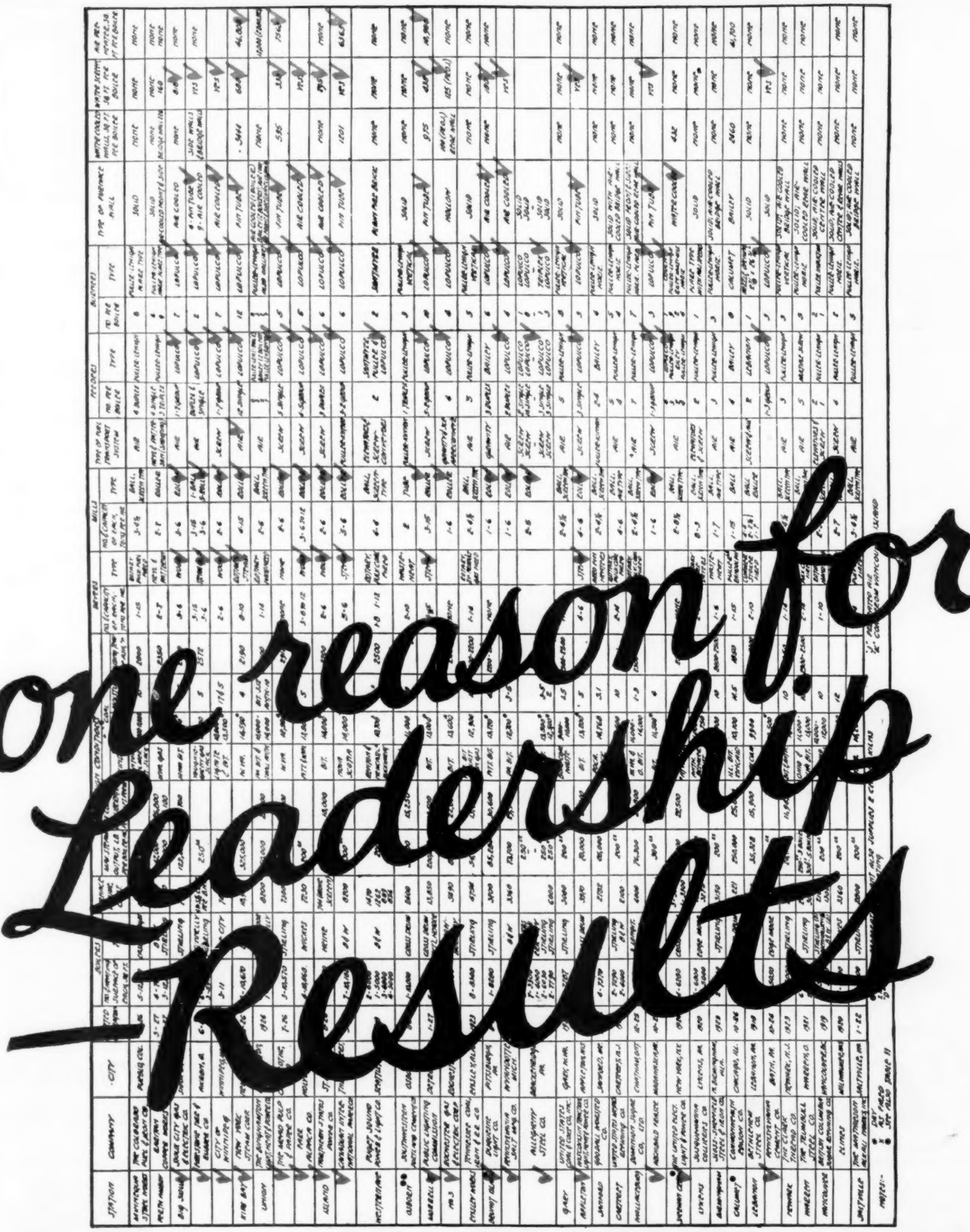
the ELLIOTT family



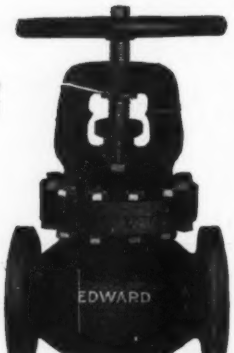


These tables from the 1927 "Pulverized Fuel" Report of the Prime Movers Committee of the N. E. L. A., show stations containing boilers of 500 h.p. and over, in the United States and Canada, using the central preparation type of pulverized fuel systems. The check marks indicate the overwhelming predominance of Lopulco equipment installed in these stations.

BOOTHS 23-5—NEW YORK POWER SHOW—DEC. 5 to 10



EDWARD



Extra Heavy Steel Stop

are the most advanced in design—in material and in construction and by far the lowest {over years of service} in total maintenance cost

"*Edward Valves or equal*" has become a standard phrase in the specification of many leading engineers and construction companies throughout the country.

The high quality of service that goes unfailingly with Edward Valves, merely reflects the years of experience in manufacture gained in solving the most severe "super-heat valve problems."

We are not building Edward Valves to meet "garden variety" competition, but to meet the exacting demands of those users who want the best valve possible to produce and which, in length of service, maintenance and dependable trouble-free operation will return to them a greater degree of economy per dollar invested.

Edward Valves, because they are built right and to fit specific needs, are efficient and durable; so much so that their first cost is a minor consideration when compared with *their low operating cost over a period of years.*

This economical operating cost, of prime importance to the largest engineering companies, is one of the major reasons why the bulk of large central station installations have been Edward.

The responsibility of valve operation should not be speculative. It should be positive. Absolute certainty of dependable operation is possible only when valves of known design and quality are used.

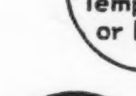
for High Pressure or Temperature or both

E V

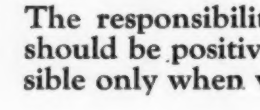
THE EDWARD VALVE

Main Office & Works

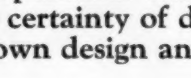
[You should have a catalog]



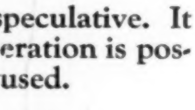
Feed Line



Blow Off



Forged Steel Check



Atmospheric Relief

VALVES

Ready Reference Chart for Edward Valves — description — sizes — catalog numbers. Note: — All valves conform to American Flange standards except 860, 870 and 890.	Available Sizes Inches	250 lbs. 500° F. Ferac	300 lbs. 750° F. Cast Steel	400 lbs. 750° F. Cast Steel	600 lbs. 750° F. Cast Steel except where marked "A"	900 lbs. 750° F. Cast Steel except where marked "A"	1,350 lbs. 750° F. Cast Steel
		Pressures shown are Working Steam Pressures. Temperatures are total degrees F.					
NON-RETURN VALVES		—	— C	atalog N	umbers —	—	—
Vertical—straightway—flanged	4 to 10	....	501	701	801	....	....
Vertical—angle elbow—flanged	4 " 12	303-C	503	703	803	1003-E	....
Globe—flanged	4 " 16	304-C	504	704	804	1004-E	....
Angle—flanged	4 " 16	305-C	505	705	805	1005-E	....
STOP VALVES							
Globe—flgd. end—flgd. bonnet	1¼ " 16	310-C	510	710	810	1010-E	1510-E
Angle—flgd. end—flgd. bonnet	1¼ " 12	311-C	511	711	811	1011-E	....
Globe—scrd. end—flgd. bonnet	1 " 3	....	520-B	720-B	....	....	....
Angle—scrd. end—flgd. bonnet	1 " 3	....	521-B	721-B	....	....	....
Globe—needle—scrd. end—union bonnet	¼ " 2	....	....	....	650-AD	....	....
Angle—needle—scrd. end—union bonnet	¼ " 2	....	....	....	651-AD	....	....
Globe—scrd. end—flgd. bonnet	¼ " 2	....	....	....	660-ABD	....	....
Angle—scrd. end—flgd. bonnet	¼ " 2	....	....	....	661-ABD	....	....
Globe—scrd. end—union bonnet	¼ " 2	....	....	....	680-ABD	1080-ABF	....
Angle—scrd. end—union bonnet	¼ " 2	....	....	....	681-ABD	1081-ABF	....
Globe—flgd. end—flgd. bonnet	½ " 2	....	....	....	860-AB	1060-AB	....
Globe—flgd. end—union bonnet	1 " 2	....	....	....	870-AB	....	....
Globe—flgd. end—flgd. bonnet	1 " 2	....	....	....	890-AB	....	....
BLOW-OFF VALVES							
Straightway—flgd. end—flgd. bonnet	1½ " 2½	....	541	741	841	1041	1541
Globe—flgd. end—flgd. bonnet	1½ " 2½	....	542	742	842	1042	1542
Angle—flgd. end—flgd. bonnet	1½ " 2½	....	543	743	843	1043	1543
DRUMHEAD STOP & CHECK VALVES							
Right hand—flgd. end—flgd. bonnet	1½ " 5	....	548	748	848	1048	1548
Left hand—flgd. end—flgd. bonnet	1½ " 5	....	549	749	849	1049	1549
CHECK VALVES (Non-Shock, Piston Type)							
Vert. or Horiz.—scrd. end—union bonnet	¼ " 2	....	....	....	674-AD	1074-AF	....
Horiz.—flgd. end—flgd. bonnet	2 " 8	....	597	797	897	1097	1597
Vert.—flgd. end—flgd. bonnet	2 " 8	....	599	799	899	1099	1599
ATMOSPHERIC RELIEF VALVES							
Dashpot type—hand operated	24 " 48	—	—	Catalog	Number	290—	—
Dashpot type—hydraulic operated	24 " 48	—	—	Catalog	Number	291—	—
Turbine type—hand operated	8 " 30	—	—	Catalog	Number	292—	—
Turbine type—hydraulic operated	24 " 30	—	—	Catalog	Number	293—	—

Symbols: A=forged steel. B=trimming—Edward protected type, integral plug or swivel plug—of Monel metal, stainless steel or carbon steel. C=Sizes 4 to 8 inches only. D=Sizes 1 inch and smaller, 600 lbs. W.S.P. —Sizes 1¼ inch and larger, 500 lbs. W. S. P. All sizes suitable for 1100° F. intermittent temperature. E=Up to and including 10 inch size. F=Up to and including 1½ inch size.

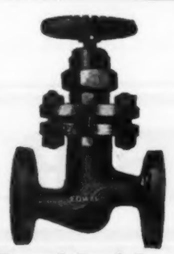
Non-Return—Motor Operated

Keep this Chart ~ Refer to Catalog Numbers When Writing ~ Please.

See them at the New York Power Show Booth No. 30

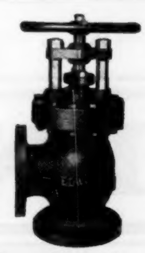
& MANUFACTURING CO.

EAST CHICAGO, IND.

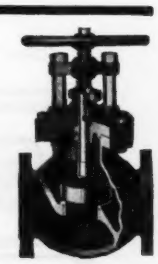


Forged Steel Stop

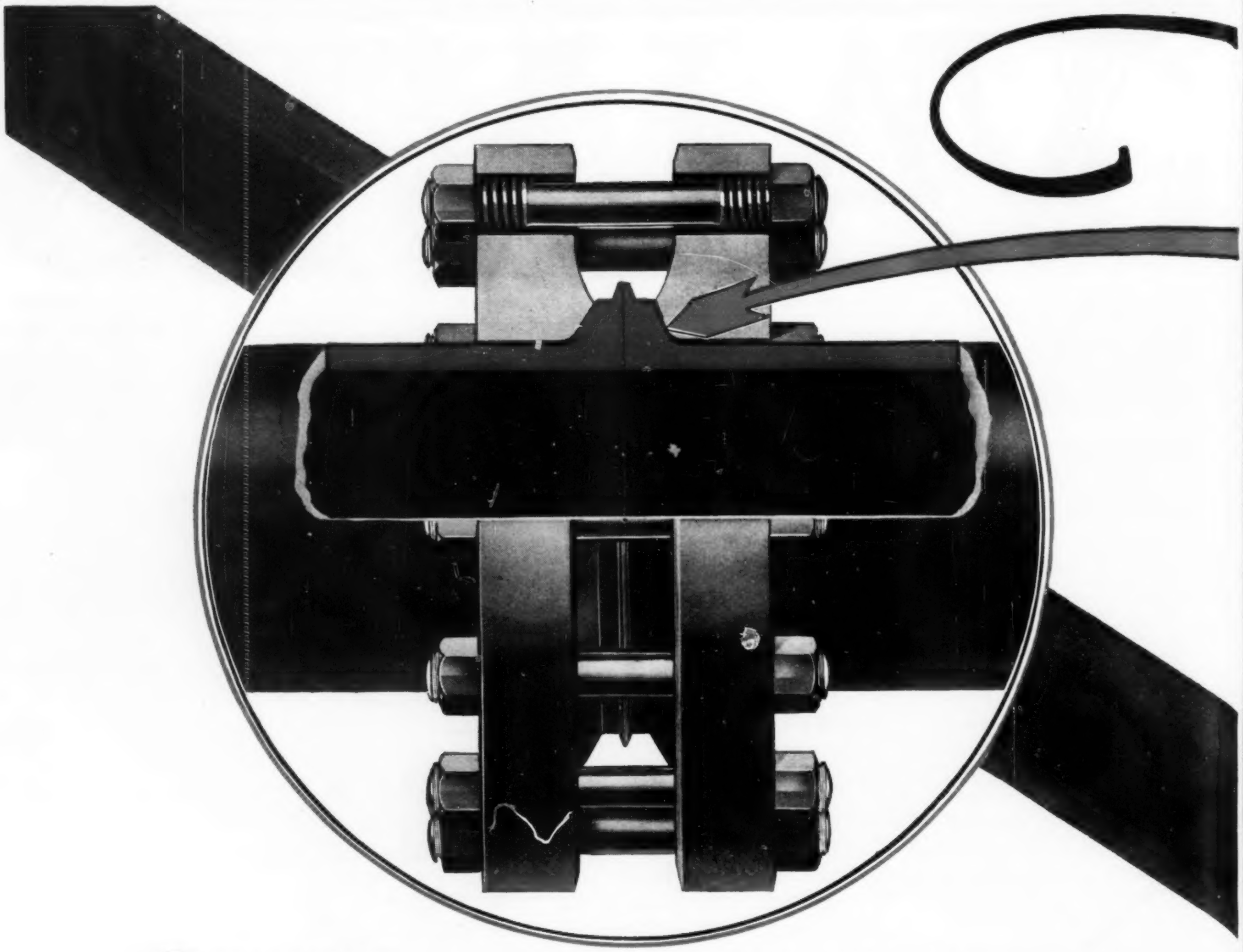
Forged Steel Stop



Ferac Non-Return



Ferac Stop



GLOBACK JOINTS are so named because the back faces of the laps are segments of globes or spheres. The flange bearing surfaces are also spherically machined. These lap and flange contact surfaces have a cold water finish. Globack Joints are improvements upon the conventional Sargol, Tongue and Groove, and Male and Female Van Stone Joints for 600, 900, and 1350 lbs. W. S. P.

Among the advantages of Globack Joints are:

1. In critical lap section, the metal thickness is twice that of the original pipe wall; from this section, the metal is gradually reduced to pipe wall thickness.
2. More uniform distribution of bolting pressure and assured fair seating of flanges.
3. Maximum stress removed from lap periphery and resultant of bolting force is shifted toward pipe wall.

See these Globack Joints at the New York Power Show, or write for Circular G-4.

MIDWEST PIPING & SUPPLY COMPANY

Plants at St. Louis and Los Angeles

Offices: ST. LOUIS, 1450 S. Second St. ∴ CHICAGO, 208 S. LaSalle St. ∴ TULSA, 805 Mayo Building ∴ LOS ANGELES, 520 Anderson St.

STRENGTH WHERE

The New GLOBACK JOINTS

(GLOBE-BACK)

improve the

SARGOL *new*

SARGOL *old*

VAN STONE *old*

VAN STONE *new*

See
GLOBACK JOINTS
at the
New York Power Show
Booth 268

by

MIDWEST

STRENGTH IS NEEDED

ent

A Chapman Chrome Nickel Steel Gate Valve for 1350 lbs. working steam pressure, 1000 deg. total temperature. Hand-operated or with motor equipment of latest improved and most up-to-date type.

an Valve

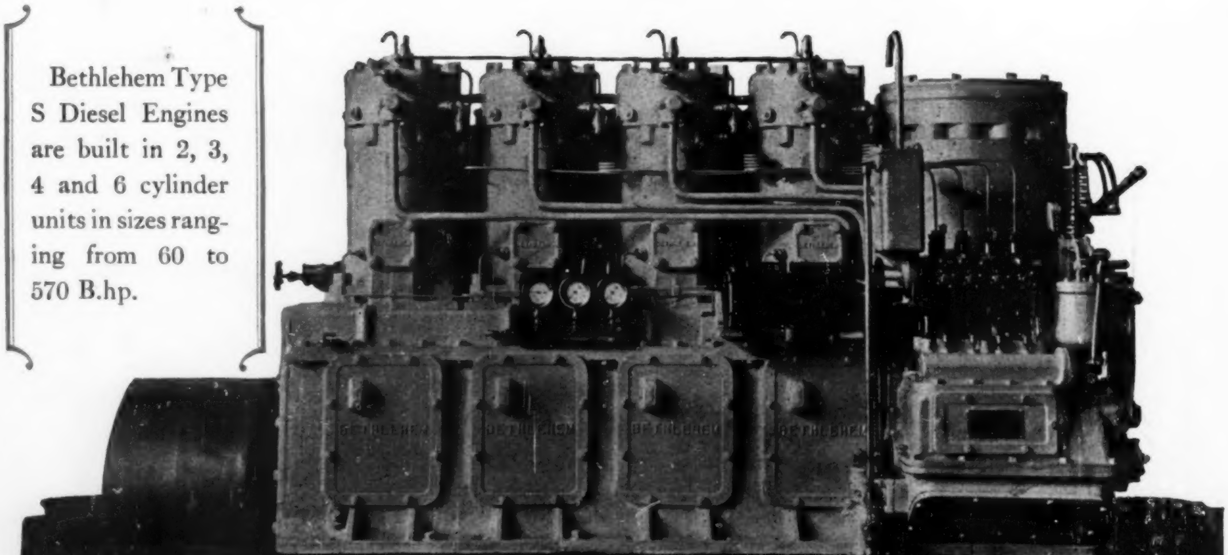
Bethlehem Power

In public service power stations, industrial power plants, factories, public buildings and institutions, office buildings, and in other fields where power is used, Bethlehem Power Plant Equipment is giving good service.

Bethlehem Diesel Engines

The many years of engine building experience, the unified control of all raw materials, the strict supervision of each manufacturing process all promote greater assurance of Reliability—with resulting Excellence of the finished engine.

Bethlehem Type S Diesel Engines are built in 2, 3, 4 and 6 cylinder units in sizes ranging from 60 to 570 B.hp.



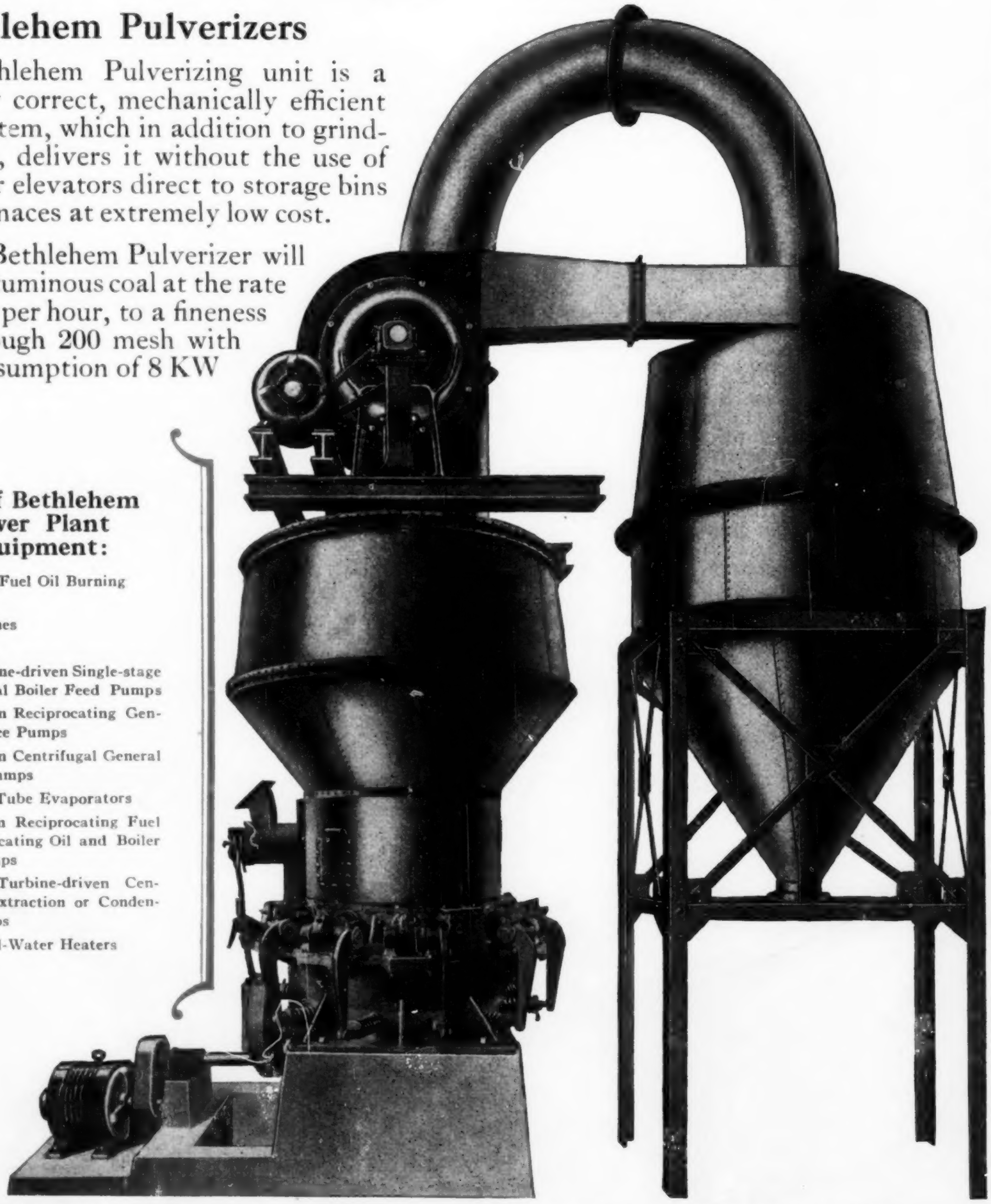
BETHLEHEM

Plant Equipment

Bethlehem Pulverizers

The Bethlehem Pulverizing unit is a scientifically correct, mechanically efficient grinding system, which in addition to grinding the coal, delivers it without the use of conveyors or elevators direct to storage bins or boiler furnaces at extremely low cost.

A No. 2 Bethlehem Pulverizer will pulverize bituminous coal at the rate of 7 net tons per hour, to a fineness of 70% through 200 mesh with a power consumption of 8 KW per ton.



List of Bethlehem Power Plant Equipment:

- Mechanical Fuel Oil Burning Systems
- Diesel Engines
- Pulverizers
- Steam Turbine-driven Single-stage Centrifugal Boiler Feed Pumps
- Motor-driven Reciprocating General Service Pumps
- Motor-driven Centrifugal General Service Pumps
- Submerged Tube Evaporators
- Steam-driven Reciprocating Fuel Oil, Lubricating Oil and Boiler Feed Pumps
- Motor- or Turbine-driven Centrifugal Extraction or Condensate Pumps
- Surface Feed-Water Heaters

BETHLEHEM STEEL COMPANY, *General Offices:* BETHLEHEM, PA.

DISTRICT OFFICES:

New York, Cleveland, Boston, Detroit, Philadelphia, Cincinnati, Chicago, Baltimore, St. Louis, Washington, San Francisco, Atlanta, Los Angeles, Pittsburgh, Seattle, Portland, Buffalo

Bethlehem Steel Export Corporation, 25 Broadway, New York City, Sole Exporter of Our Commercial Products

BETHLEHEM

DIXON'S
GRAPHITE PRODUCTS

The best graphite procurable—the right graphite for each particular purpose —these are the reasons for Dixon superiority.

We have had one hundred years of experience in manufacturing and marketing graphite products—and in this period the name "Dixon" has spread around the world. To thousands of exacting men in every line of industry that word is synonymous with graphite.

Dixon's Ticonderoga Flake Graphite. **Ideal for cylinder and bearing lubrication, for coating gaskets, and for any other purpose where a better graphite is desired.**

Dixon's Graphite Cup Grease. **The best quality mineral stock correctly proportioned with lubricating flake graphite. It has the property of flowing into the bearing as soon as the shaft begins to turn, instead of remaining stiff in the cup till the bearing heats and softens it. Produces dead smooth, graphited bearing surfaces—insures cool running engine, motor, shaft and other bearings.**

Dixon's Solid Belt Dressing. **Keeps leather belts pliable and decidedly lengthens belt life. Stops slipping instantly. Used for leather, rubber or fabric belting.**

Dixon's Waterproof Grease. **Protects and lubricates elevator plungers, pump plungers, gears, wire rope, and other parts exposed to weather or submerged in fresh or salt water. Will not flush off.**

Dixon's Silica-Graphite Paint. **For the protection of metal surfaces against moisture, water, acid, alkali and other rust creating agencies.**

We publish an interesting booklet of over 50 pages, illustrated containing much of value to you men of the power world. Would you like a copy? Ask for book 100-KP.

JOSEPH DIXON CRUCIBLE COMPANY

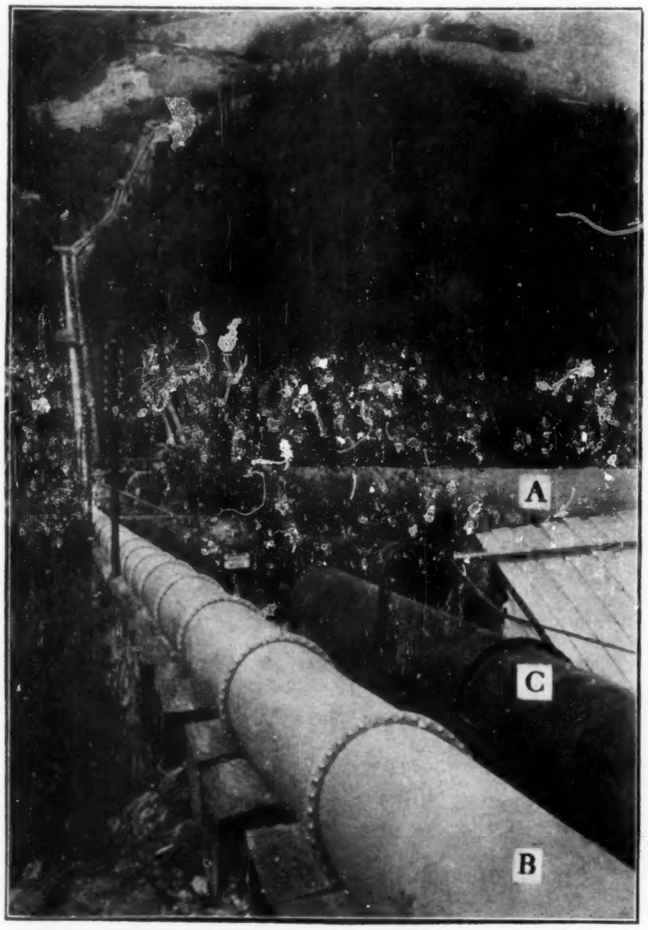
Jersey City, N. J. Established 1827

1827—ONE HUNDREDTH ANNIVERSARY—1927

Booth 254

New York Power Show

Progress in Pressure Main Construction



Hydraulic Pressure Main of 350 lbs. per sq. in.
Diameter 48"

QUASI-ARC ELECTRODES

Applied according to Quasi-Arc designing and welding principles are increasingly replacing former methods of joining plates and shapes in important steel constructions. This is mainly due to the correct composition of the Quasi-Arc Electrodes thus giving critical metallurgical conditions rendering the welding process highly efficient, uniform and easy to handle.

← A **First Main Riveted**

← C Third Main

Quasi-Arc WELDED

← B **Second Main Water Gas Welded**

QUASI-ARC PRODUCTS

Quasi-Arc Patent Electrodes are supplied ready for use in standard lengths of 18 inches, and with cores of various diameters, according to size and nature of work for which they are required, as follows:—

Mild Steel Electrodes Suitable for general welding of Iron or Mild Steel, Structural Steel Work, Bridge Reinforcement, Tanks, Ship Construction, etc.

Overhead Electrodes Suitable for any overhead or vertical welding.

Special Boiler Electrodes Suitable for boiler welding and work to be subjected to stresses at high temperatures.

Electrodes for Cast Iron Suitable for the repair of iron castings.

Carbon Steel Electrodes Suitable for reinforcing worn parts of machinery, building up teeth of steel gear wheels, reinforcing steel wobbler ends for rolling mills, grooves of ropeway pulleys, rail treads, etc.

Manganese Steel Electrodes Suitable for reinforcing or building up Manganese Steel crusher jaws, dredger bucket lips, frogs and crossings, etc.

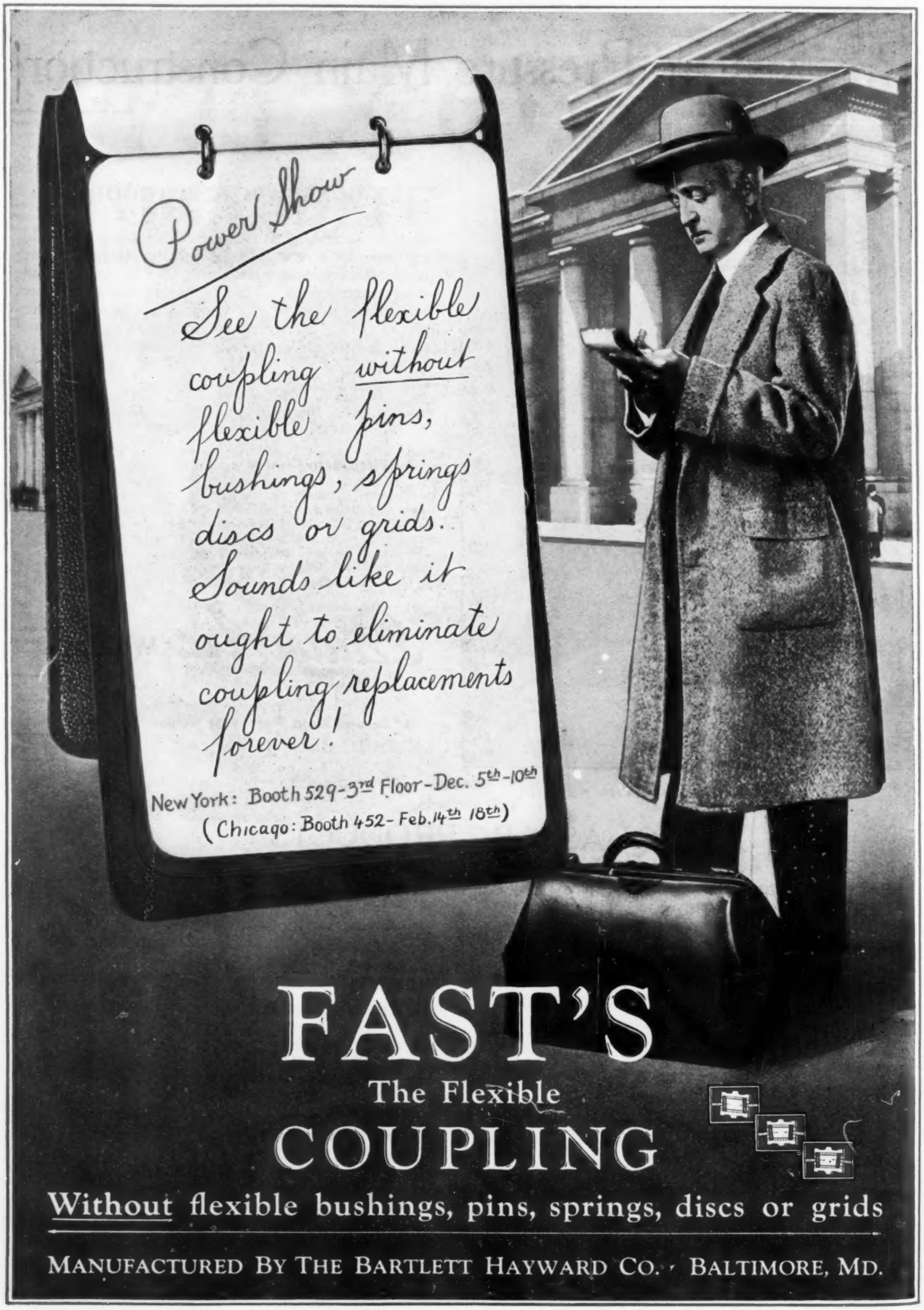
Vanadium Steel Electrodes Suitable for building up gear wheels, crank shafts, axles, etc., which may require case-hardening.

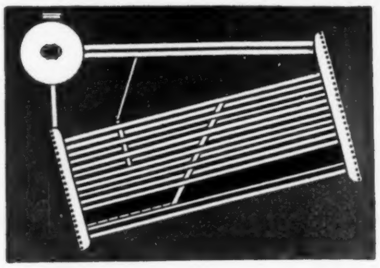
Stainless Steel Electrodes Suitable for welding Stainless Steel.

QUASI-ARC INCORPORATED

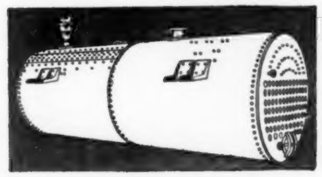
Manufacturers of and Consultants in reference to the Application of Quasi-Arc Electrodes and Welding Equipments.

11 West 42nd Street, New York, N. Y.

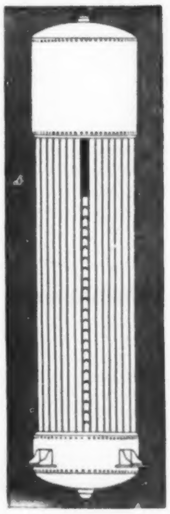

Power Show
See the flexible coupling without flexible pins, bushings, springs discs or grids. Sounds like it ought to eliminate coupling replacements forever!
New York: Booth 529-3rd Floor-Dec. 5th-10th
(Chicago: Booth 452- Feb. 14th 18th)
FAST'S
The Flexible
COUPLING
Without flexible bushings, pins, springs, discs or grids
MANUFACTURED BY THE BARTLETT HAYWARD CO. · BALTIMORE, MD.



HORIZONTAL CROSS DRUM

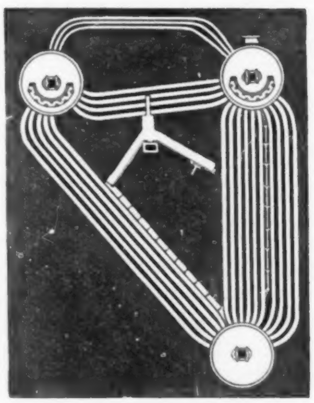


HORIZONTAL TUBULAR



VERTICAL

Steam Generation by WICKES



THREE DRUM

WICKES Boilers generate steam for many modern industrial power plants. Where the demand for steam is small the boiler may be a Horizontal Return Tubular. Where the demand is large, or for high pressure, the boilers are water tubes — Vertical — Horizontal Cross Drum or Three Drum Curved Tube. Briefly, the Vertical has vertical straight tubes, easily cleaned, and of excellent design for certain plants. The Horizontal Cross Drum quickly responds to overloads and has a high terminal efficiency. The new Three Drum is the simplest of curved tube design; has a stabilized water level and an integral superheater, which delivers superheated steam. A Wickes Boiler may be selected to meet the plant requirements as well as the user's preference.

The Wickes Boiler Co. has pioneered in boiler design and construction. Into each type is built important features of design, making it particularly valuable for the respective service. Boilers built in the Wickes shops are fabricated in accordance with the highest standards known in the boiler making art. Performance and low cost of maintenance have been proven with Wickes Units.

Bulletins will be mailed on request to those interested in steam generation—or Sales Engineers will call at your convenience.

Visit Booth 285 New York Power Show Dec. 5-10

THE WICKES BOILER CO.

Established 1856
Saginaw, Mich.

SALES OFFICES:

New York, 501 Fifth Ave.
Pittsburgh, 1218 Empire Bldg.

Detroit,
General Motors Bldg.

Chicago, 33 S. Clark St.
Seattle, 736 Henry Bldg.

The Two Servants

Two old servants were allowed to select the loads they would carry on a lengthy trip. The wise one took a great basket of fresh bread. The foolish one picked out the small, heavy load of gold. After the first day or two, the bread was eaten, and the first carrier had only the empty basket. The other carrier had his heavy load unchanged for the entire trip.

—Aesop.

Selection is an Art

Selection in Aesop's time as compared to now was a simple matter. Today the engineer who makes a wise selection has to be pretty level headed.

Nothing can be *claimed* for Dearborn Treatment that has not been claimed for hundreds of boiler compounds. Yet, engineers are selecting Dearborn Service every day. The facts are these:

Procedure: A gallon sample of your boiler feed water is sent to the Dearborn laboratories for analysis. Operating conditions are detailed, including any use that may be made of the water in industrial processes. Our chemists and engineers work out the formula of the proper treatment. This treatment is made up in the Dearborn factory and is used in the boiler in accordance with directions. Dearborn Service Men assist the engineer in getting started properly.

Relation: The Dearborn Chemical Company has become the chemical adviser for its customers on the use of water for steam for power as well as industrial purposes. Dearborn Treatment is prepared to correct and eliminate harmful boiler conditions. Should water or operating conditions change, new water samples are analyzed and the formula of treatment is varied as necessary to meet the new situation.

Development: For forty years engineers have been relying on the Dearborn Organization. Since we approach every problem as an individual one, work out the solution on strictly scientific lines, and assist the engineer in all details of application, the results are bound to be satisfactory.

We have always maintained the same standard of strict adherence to correct scientific procedure, so, it is small wonder that today a large percentage of engineers use Dearborn Service.

In view of these facts, isn't it worth the little effort to put your problem into the care of a house of this type, in order that your future burden may be as light as the empty basket? Selection is an art. Talk with your Dearborn Service man or write us.

Dearborn Service includes also, Dearborn Scientific Lubrication, NO-OX-ID Rust Prevention, Control of Corrosion in Closing Systems, Dearborn Cleaners.

Visit us at Booth 13, at the 6th National Exposition of Power and Mechanical Engineering.

Dearborn Chemical Company

310 South Michigan Avenue, Chicago **299 Broadway, New York City**

Dearborn

REG. U.S. PAT. OFFICE

BEARIUM BEARINGS

LINER CASTINGS FOR LINER TYPE RING OILING RIGID BEARINGS

ENGINEERING DATA

Shaft—6" Dia.
Length of Bearing—19½."
Weight—200 lbs. per pair.
Operating Temp.—450°F.
Grade of Metal—B6, containing 24% Lead.
Bearing Base and Oil Bath Water Cooled.

APPLICATION

This lot of six pairs was recently supplied a prominent cement company for use in large fans.

Being used to save time in making replacements and to avoid bearing troubles.

Another Interesting Application and Indorsement from a Manufacturer of Screw Machines

"This material was first introduced to us about a year ago and we frankly state that we were skeptical about the claims made for the material at that time. Since then we have used it particularly on machines and on work where the conditions are the worst and in every case so far it has stood up and *more than justified the maker's claims.* We have used it on bearings for screw machines of all sizes and, as you know, these bearings receive a tremendous amount of punishment on account of forming and turning hexagon bars most times at excessively high speeds."

See Our Exhibit at Booth 524

The Following Distributors carry our Standard Line of CORED and SOLID BARS

Boston	Lewis E. Tracy Co.	Montreal	F. Bacon & Co., Ltd.
Buffalo	Root, Neal & Co.	New Haven	The C. S. Mersick & Co.
Chicago	Paulsen Supply Co.	New York City	Topping Bros.
Cincinnati	The E. A. Kinsey Company	Philadelphia	Maddock & Company
Cleveland	The Strong, Carlisle & Hammond Co.	Pittsburgh	Pittsburgh Gage & Supply Co.
Detroit	The Strong, Carlisle & Hammond Co.	Rochester	Cook Iron Stone Co.
Erie	Coblentz Tool & Supply Co.	Schenectady	Clark Witbeck Co.
Holyoke	J. Russell & Co.	St. Louis	Handlan-Buck Manufacturing Co.
Indianapolis	The E. A. Kinsey Company	Syracuse	The C. H. Wood Co.
Kalamazoo	The Edwards & Chamberlain Hardware Co.	Toledo	The M. I. Wilcox Co.
Long Island City	Long Island Hardware Co.	Toronto	H. A. Harrison Tool Company

ENGINEERING SERVICE

For Engineering Service Apply to our Engineering Department.

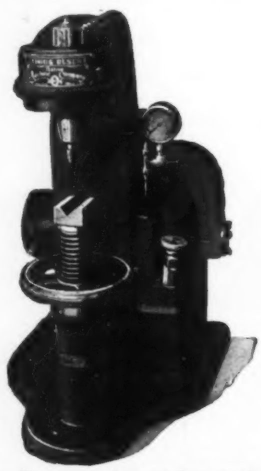
BEARIUM BEARINGS, INC.

261 FRANKLIN ST., BOSTON, MASS.
and 258 STATE ST., ROCHESTER, N. Y.

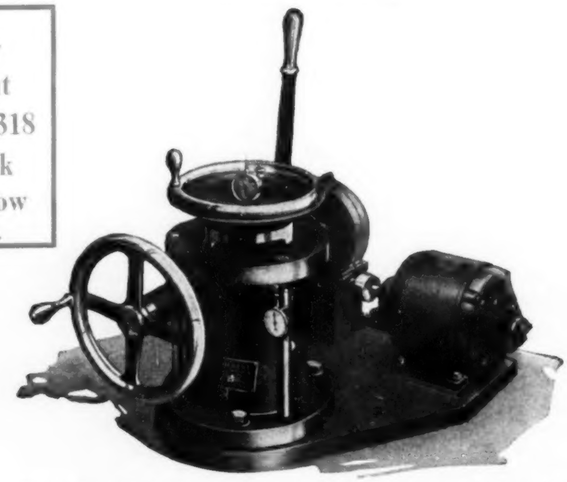
OLSEN
Testing and Balancing Machines

Olsen Direct Motor Driven Production Brinell Hardness Tester

Olsen Ductility Testing Machine No. 2-A



See Our Exhibit at Booth No. 318 New York Power Show



The above machine illustrates the very last word in equipment for applying the Brinell test on a real production basis. The load is applied in less than 2 seconds time and removed instantaneously. This Hardness Tester excels, not only in accuracy and reliability and production, but is the ideal machine for its simplicity in construction and the ease with which it may be used.

The above machine represents the last word in equipment for determining the drawing quality of sheet metal as used in the automotive industry. Both the depth of cup and the pressure required to cup the material is indicated and power applied at a uniform rate through the motor drive as shown.

Olsen Testing Machines may be secured for determining the strength and quality of any kind of material. Specify your requirements and literature will be forwarded illustrating and describing the equipment best suitable to test same.

Knowledge is Power

SEE THE NEW
OLSEN-LUNDGREN DYNAMIC BALANCING MACHINE

Specially designed and constructed for balancing high speed rotating parts.

A new development using new principles in the construction of a Balancing Machine.

A very accurate, reliable and quickly operated Balancing Machine.

Be sure and witness a demonstration of this machine at the Show.

Also see the following equipment that will likewise be demonstrated:

Olsen Brinell Proving Ring.
Herbert Pendulum Hardness Tester.
Olsen Static Balancing Machine No. 2 for balancing clutches, circular saws, emery wheels, narrow face pulleys and flywheels.
Olsen-Lundgren Static Wheel and Tire Balancing Machine, especially adapted for balancing Wheels and Tires on production.

Sole Manufacturers

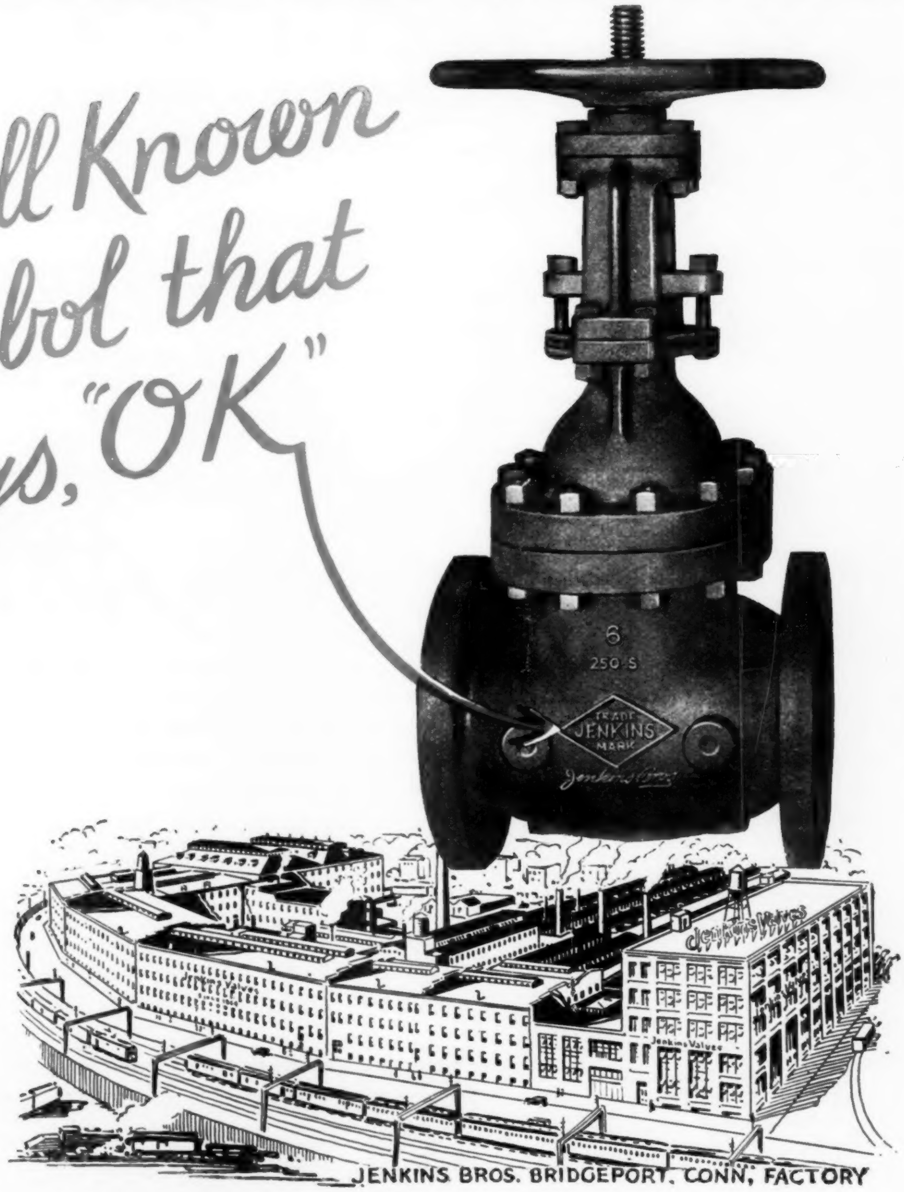
TINIUS OLSEN TESTING MACHINE CO.

500 N. 12th St., Philadelphia, Pa., U. S. A.

TRADE JENKINS MARK

Jenkins Bros

The well Known Symbol that Says, "O K"



JENKINS BROS. BRIDGEPORT, CONN, FACTORY

Fig. 715
Jenkins Bronze Fire Line Angle Valve

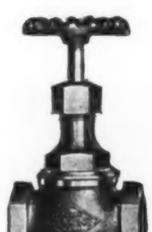


Fig. 106
Screwed Jenkins Standard Bronze Globe Valve

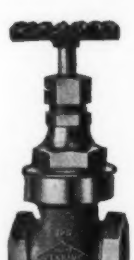


Fig. 370
Screwed, Jenkins Standard Bronze Gate Valve

ENGINEERS who seek to minimize plant maintenance are guided in their valve selections by the Jenkins Diamond. It is a symbol that says "O.K. to install," and indicates a valve made for the maximum service, not merely the average.

Jenkins Valves may cost a little more, but represent an investment in trustworthy service—true valve economy.

The Jenkins Extra Heavy Iron Body Gate Valve shown above is recommended for working steam pressures up to 250 lbs., working water pressures up to 400 lbs.

Visit the Jenkins Exhibit at Space 90, New York Power Show, Dec. 5–10, 1927.

JENKINS BROS.

80 White Street..........New York, N. Y.
524 Atlantic Avenue.........Boston, Mass.
133 No. Seventh Street.....Philadelphia, Pa.
646 Washington Boulevard.....Chicago, Ill.

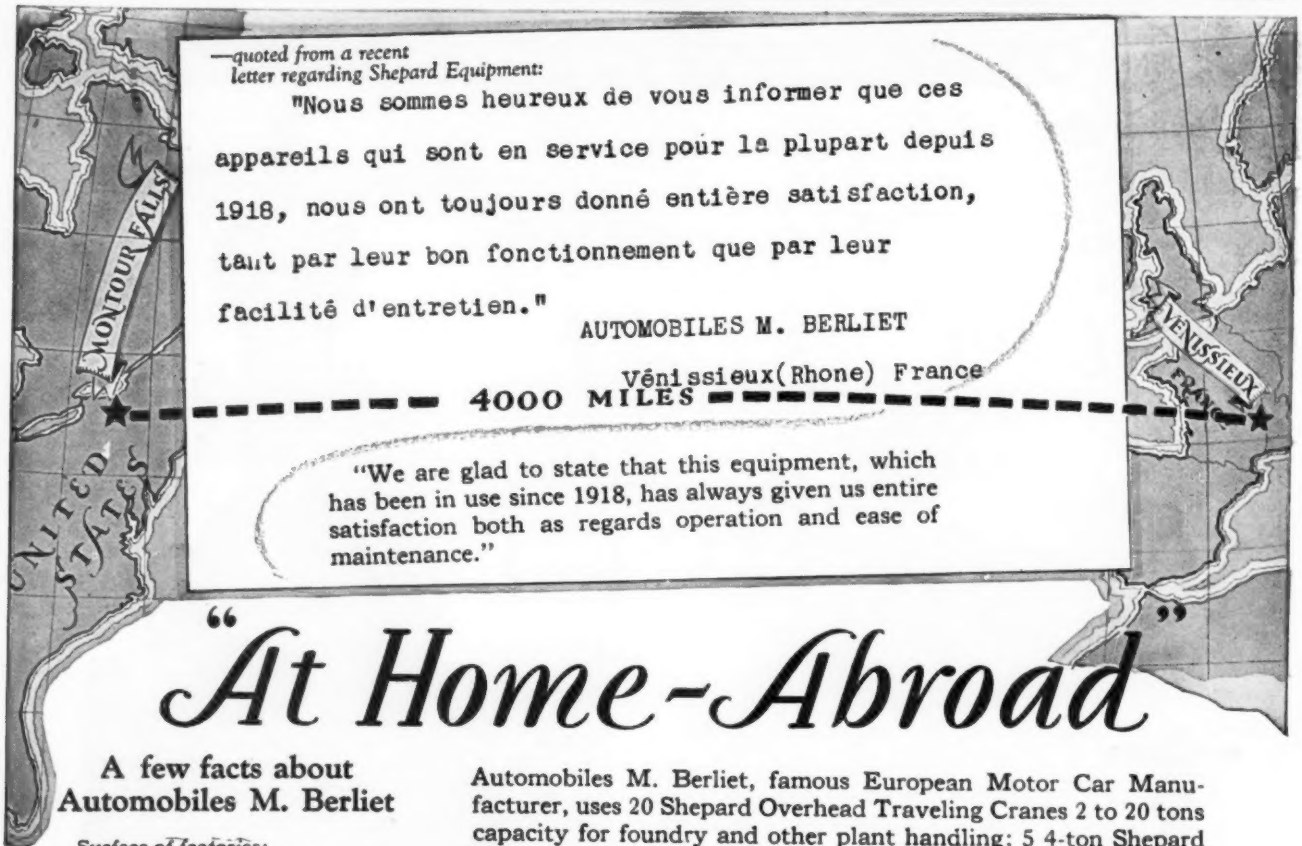
JENKINS BROS., LIMITED
Montreal, Canada London, Eng.

FACTORIES
Bridgeport, Conn. Elizabeth, N. J.
Montreal, Canada

Always marked with the "Diamond"

Jenkins Valves

SINCE 1864



—*quoted from a recent letter regarding Shepard Equipment:*

"Nous sommes heureux de vous informer que ces appareils qui sont en service pour la plupart depuis 1918, nous ont toujours donné entière satisfaction, tant par leur bon fonctionnement que par leur facilité d'entretien."

AUTOMOBILES M. BERLIET

Vénissieux(Rhone) France

"We are glad to state that this equipment, which has been in use since 1918, has always given us entire satisfaction both as regards operation and ease of maintenance."

"At Home-Abroad"

A few facts about Automobiles M. Berliet

Surface of factories:

Under roof	42 acres
Avenues and parks	178 "
Workmen's Community	106 "
Yard space	652 "
Total acreage	978 acres
Trackage within plant	12½ miles
Power used	5000 H. P.
Number of machines	3500
Total force	6000 men

Shepard Equipment in plant of Automobiles M. Berliet

Iron and Steel Foundries:
7 4-ton 53 ft. Traveling Cranes
4 1-ton Hoists

Forge:
1 4-ton 65 ft. Traveling Crane
1 2-ton 33 ft. " "

Presses:
3 4-ton 53 ft. Traveling Cranes
1 10-ton 53 ft. " "
1 20-ton 53 ft. " "

Machining:
1 4-ton 53 ft. Traveling Crane
1 4-ton 33 ft. " "

Truck Assembly:
1 2-ton 46 ft. Traveling Crane

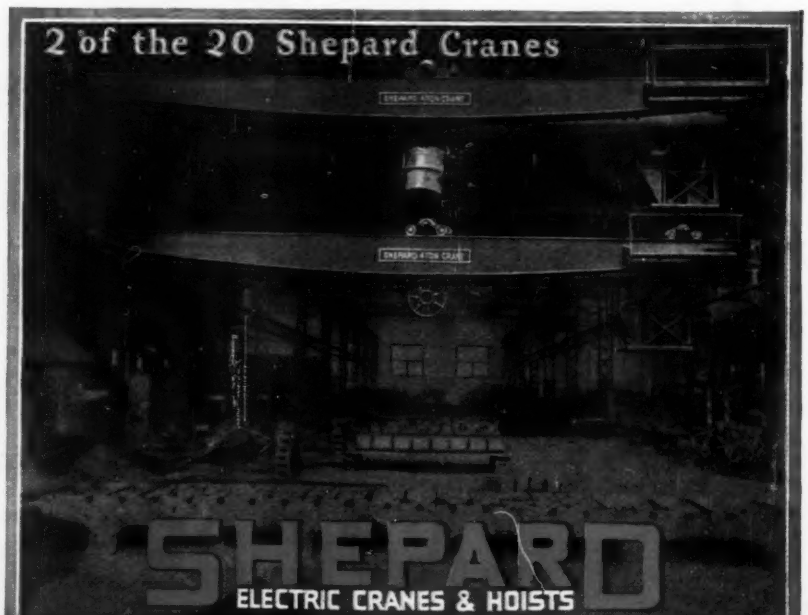
Maintenance Dept.:
1 4-ton 62 ft. Traveling Crane

Yard:
1 5-ton 82 ft. Traveling Crane
1 10-ton 46 ft. " "
1 2-ton Hoist

Automobiles M. Berliet, famous European Motor Car Manufacturer, uses 20 Shepard Overhead Traveling Cranes 2 to 20 tons capacity for foundry and other plant handling; 5 4-ton Shepard Hoists for charging cupolas; and 4 Shepard Speed Reducers for operating converters.

Shepard equipment finds its way to all corners of the Globe—Europe, Africa, Asia, Australia, Canada, South America and the United States where it predominates in practically every industry.

Any place is home to a Shepard—wherever put to work a Shepard Crane or Hoist is an investment in trustworthy service—ease of operation and low maintenance.



SHEPARD ELECTRIC CRANE & HOIST CO. *Montour Falls, N.Y., U.S.A.*

BIG GEARS

WE CAN CUT THEM FOR YOU OR SELL YOU THE MACHINES TO CUT THEM YOURSELVES

MAAG GEARS

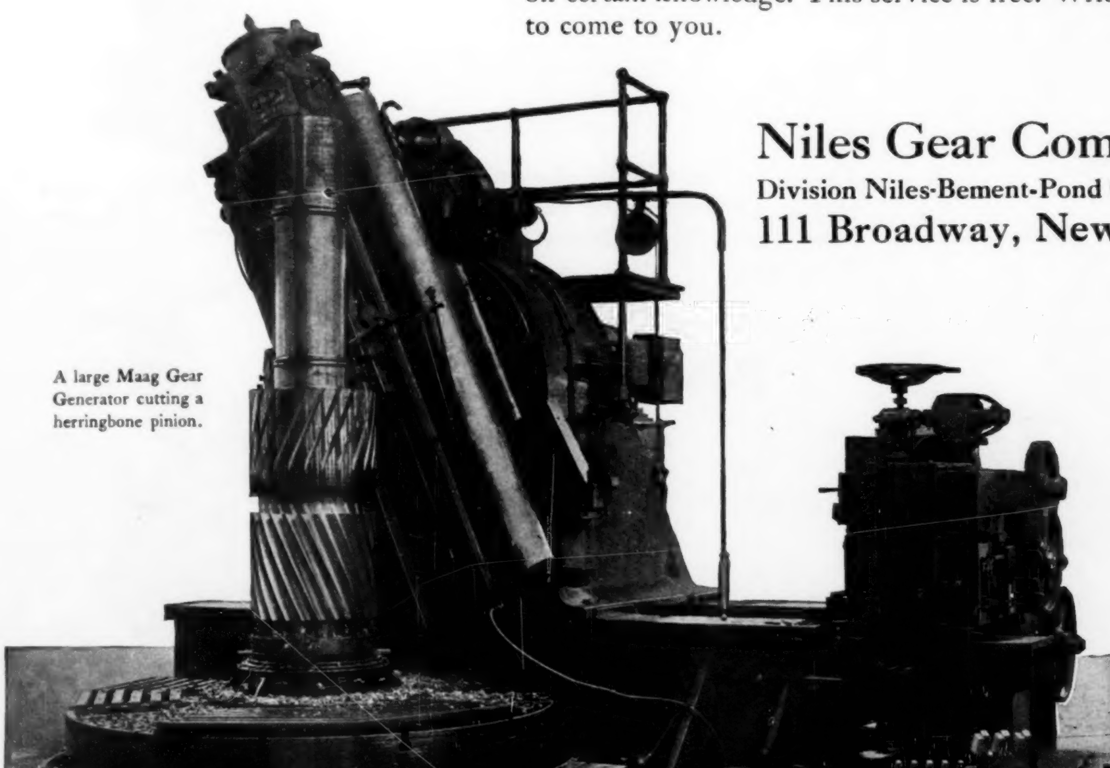
Visit our Booths Nos. 457-458 at the Power Show

Large gear cutting equipment is not necessary in every shop. The demand for gears over 5 to 6 feet in diameter is comparatively small. To shops which have little demand we offer our services. We are equipped to cut Maag Gears in any size from 1″ to 40′ in diameter. The men who do this work are gear experts, theoretical and practical. Because of the perfect tooth form, Maag Gears are the quietest, strongest and longest lasting of all gears made today.

To the big user of large gears we can now offer Maag Gear Generators. We recently acquired the right to build and sell them in this country and can supply these generators (which use the straight side rack cutter) in a range of sizes to suit your work.

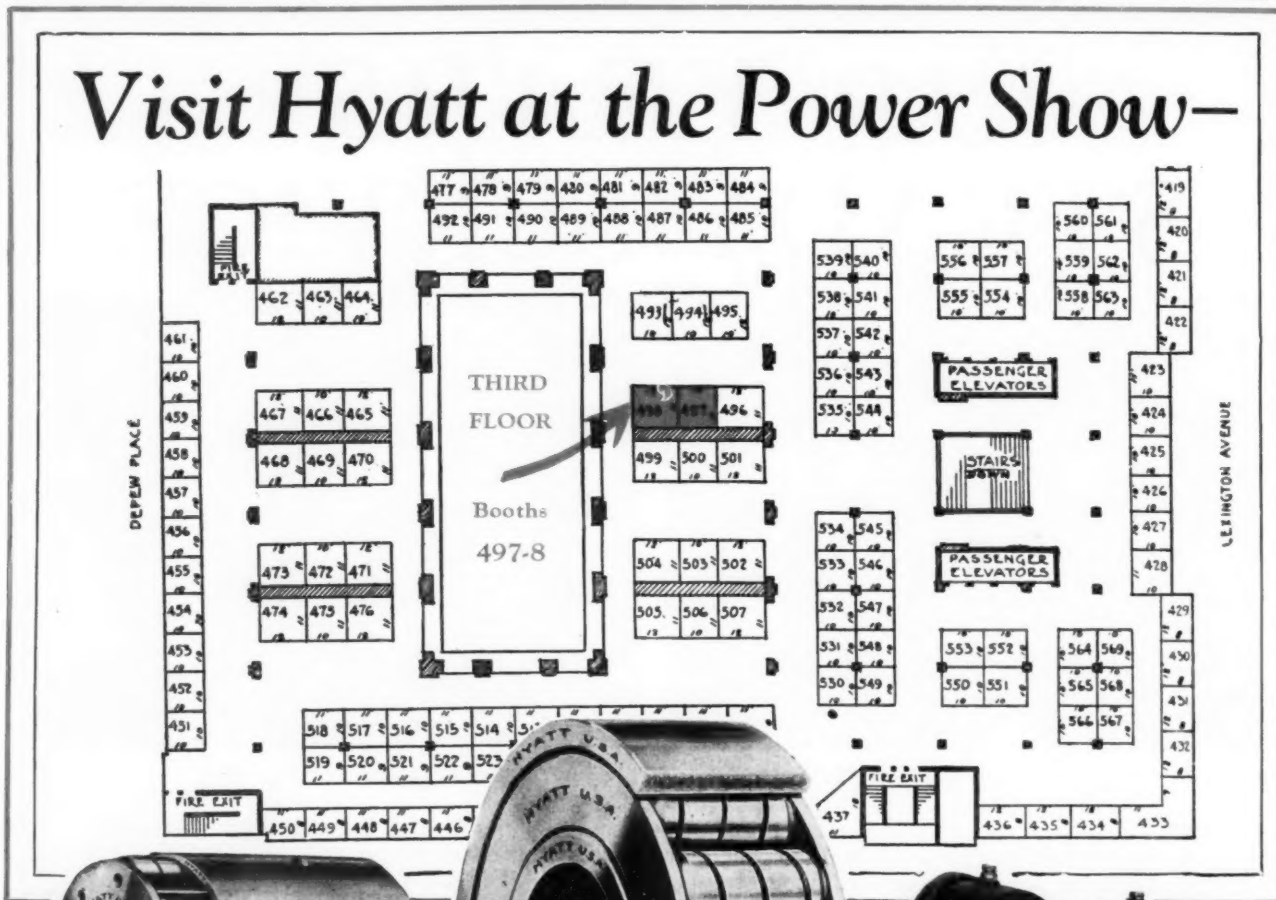
Regardless of your gear needs, whether you want gears cut or machines to cut them, it will pay you to talk to a Niles gear specialist. The information he can give you is based on certain knowledge. This service is free. Write for him to come to you.

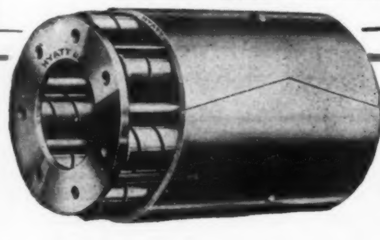
Niles Gear Company
Division Niles-Bement-Pond Company
111 Broadway, New York



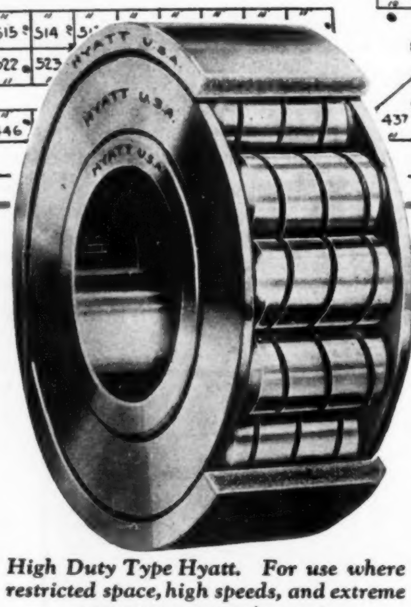
A large Maag Gear Generator cutting a herringbone pinion.

Visit Hyatt at the Power Show—

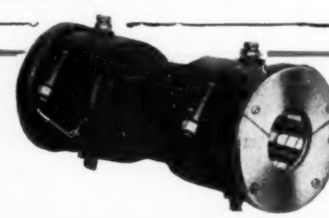




"Planished outer race" type generally employed where speeds are less than 1000 R. P. M., where space is not a prime consideration, and accuracy requirements approximate those of commercial shafting



High Duty Type Hyatt. For use where restricted space, high speeds, and extreme accuracy are requirements



Hyatt Line Shaft Bearing saves 15% of the total power bill; easy to install, bearing completely split; fits all standard hangers, size for size. Noted for its many years of successful performance in large and small plants

FOR every application there's a suitable Hyatt Roller Bearing. Discuss your bearing requirements with Hyatt engineers, booths No. 497-498, at the Power Show.

HYATT ROLLER BEARING COMPANY

Newark Detroit Pittsburgh Chicago Oakland

HYATT

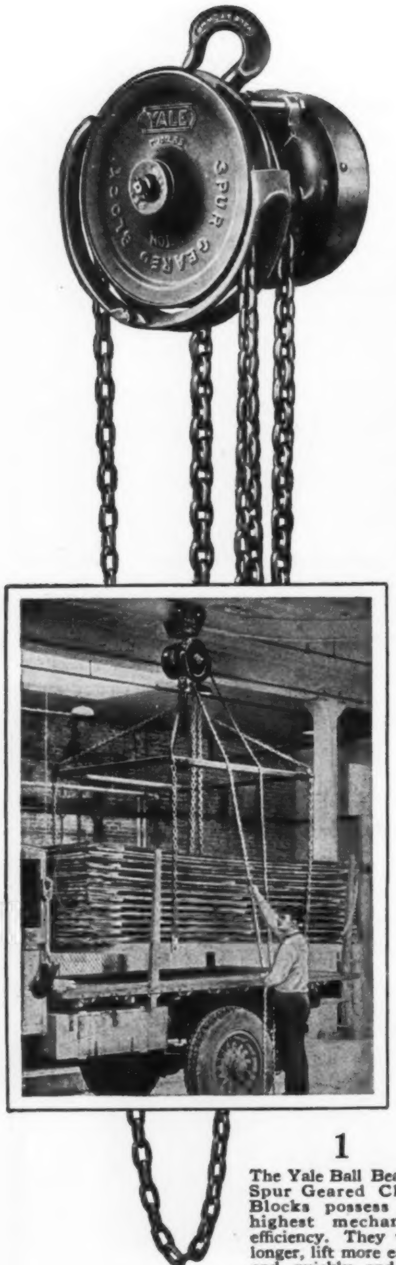
ROLLER BEARINGS

PRODUCT OF GENERAL MOTORS

BOOTHS 622-3—NEW YORK POWER SHOW—DEC. 5 to 10

TRADE **YALE** MARK

Chain Blocks

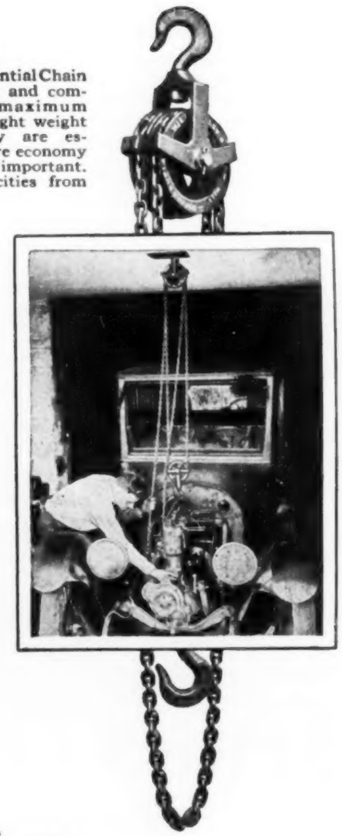


1

The Yale Ball Bearing Spur Geared Chain Blocks possess the highest mechanical efficiency. They wear longer, lift more easily and quickly and are safer than any other block made. A pull of 77 lbs. on the hand chain lifts a 1 ton load. Made in capacities from ¼ to 40 tons.

2

The Yale Screw Geared Chain Block is portable, light and powerful and takes up less headroom than other types of blocks. A pull of 87 lbs. on the hand chain lifts a 1 ton load. Made in capacities from ½ to 5 tons.



3

The Yale Differential Chain Block is strong and compact, giving maximum service where light weight and portability are essential but where economy of effort is not important. Made in capacities from ¼ to 2 tons.

Which of these YALE Chain Blocks is best for You?

The ever-widening field of uses for chain blocks finds Yale equipped to meet it in every possible respect. Yale Blocks—Ball Bearing Spur-geared Chain Blocks, Screw-geared and Differential Chain Blocks, collectively answer every requirement that ever existed on any hoisting job where saving time, labor and maintenance expense are factors. Individually, you will find one or more of these types of Yale Chain Blocks specifically and preeminently suited to your purpose.

Distributors of Yale Products are fully equipped to advise you without bias as to the right type of block for your work. Inquiry to them or direct to us will bring prompt information.

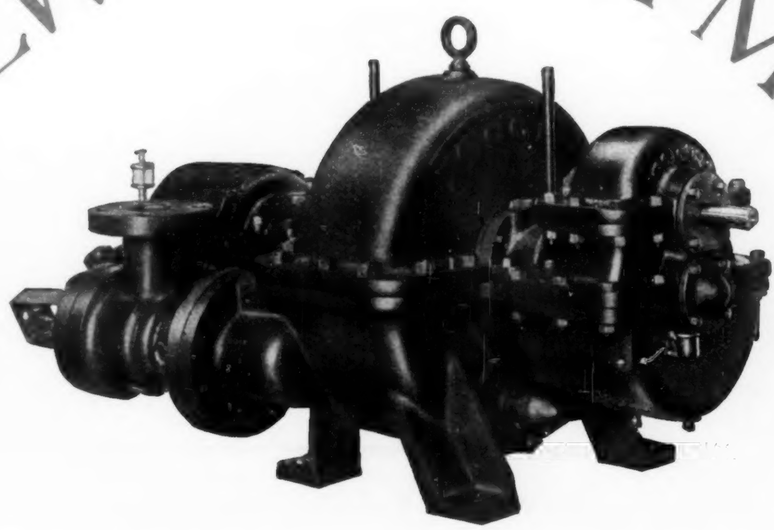
The Yale & Towne Mfg. Co., Stamford, Conn., U. S. A.
Canadian branch at St. Catharines, Ont.

YALE **Hoisting and Conveying Systems**

YALE MARKED IS YALE MADE

MOORE

A NEW DEVELOPMENT



Combined Single Stage Turbine and Reduction Gear

To meet the demand for a highly efficient steam turbine for driving moderate speed auxiliaries, we have developed this combined turbine and reduction gear.

The outstanding features are—LOW STEAM CONSUMPTION, MODERATE PRICE, SMALL FLOOR SPACE AND EASE OF MOUNTING.

Built in sizes ranging from 5 to 50 H.P., and for driven machine speeds ranging from 600 to 2000 R.P.M.

Especially adapted for fan, blower, pump or generator drive where low steam consumption is essential.

Let our engineers explain all details at the New York Power Show.

BOOTHS 508 and 509

We Will Also Exhibit

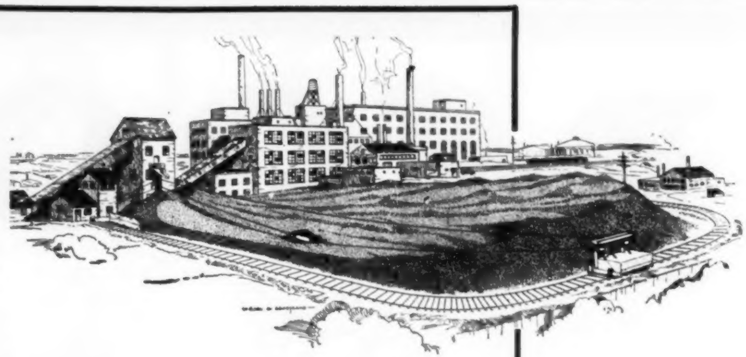
STEAM TURBINES—REDUCTION GEARS—PUMPS

MOORE STEAM TURBINE CORPORATION
WELLSVILLE, NEW YORK

Offices in all principal cities

In Canada: Ontario and East; General Supply Co. of Canada, Ltd., Ottawa. Manitoba and West; Darling Bros., Ltd., Montreal

Few Cents per Ton Now Covers Cost of Storing Coal



Any ground space adjacent to a power plant can be converted into a coal storage yard quickly and economically by installing a Sauerman Power Drag Scraper.

The area may be any shape and any length and width up to 1,000 ft. A single Sauerman installation, operated by one man, will cover the entire area with coal, either building up one huge pile to maximum height or several separate piles if the plant uses more than one grade of coal. To reclaim, the scraper bucket simply is turned around on the operating cables.

Every coal storage problem, small or large, is within the range of this flexible machine. Among the hundreds of central station plants, industrial power plants and coal docks equipped with Sauerman Scraper systems, are some that burn less than 10 tons per hour and others with capacity requirements running as high as 6,000 tons per day. Drawing upon their years of experience in this work, Sauerman engineers are able to devise an economical scraper layout for storage projects of every size.

All the facts about this modern method of storing and reclaiming coal and other bulk materials are set forth in a 48-page booklet, illustrated with diagrams and photographs of different types of installations. Ask for Booklet No. 8.

SAUERMAN BROS., Inc., 470 S. Clinton St., CHICAGO

SAUERMAN

POWER SCRAPERS FOR COAL STORAGE

The above sketch shows a rapid-operating Sauerman Power Drag Scraper system installed at an industrial power plant to handle a 150,000-ton coal pile. The capacity of this particular installation is 200 tons per hour, either storing or reclaiming.

The important features of this and other Sauerman installations of different types and sizes will be demonstrated by a working model and further illustrated through motion pictures at

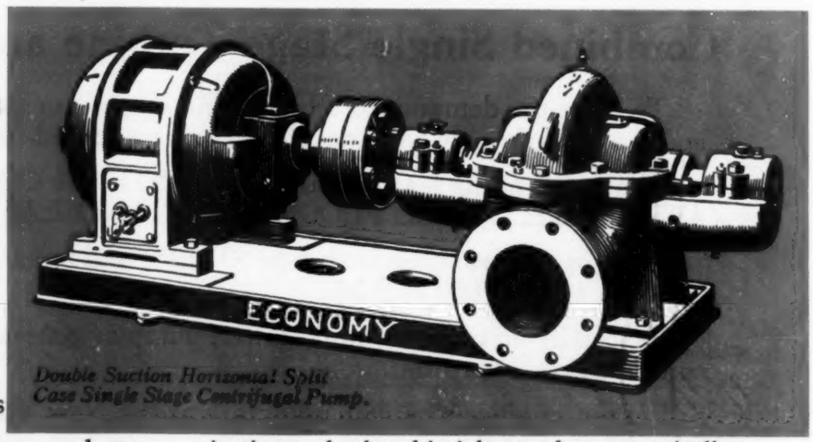
BOOTHS 520-21
NEW YORK
POWER SHOW

BOOTH 471—NEW YORK POWER SHOW—DEC. 5 to 10

See the Latest Improvements in Pump Design at

BOOTH 471

Redesigned new models
Double Suction Pumps
Multi-Stage Pumps
Pumps and Receivers
Sump Pumps
Return Line Vacuum Pumps



Double Suction Horizontal Split Case Single Stage Centrifugal Pump.

HIGH efficiencies, simple designs and mechanical dependability have made fine records of service for Economy Pumps. In every water handling problem, it is important to have a pump that will perform reliably with a minimum of attention. General water supply in buildings and industrial establishments, vacuum and gravity heating service, sewage ejection and other big jobs can be economically handled by a pump that has, in many cases, operated 15 years and more without interruption.

Special bulletins on any type of pump that your problem calls for will be sent on request to those who do not attend the Power Show.

Economy Pumping Machinery Company
3431 West 48th Place, Chicago

Representatives in Principal Cities—Telephone and Address under Economy Pumping Machinery Co.

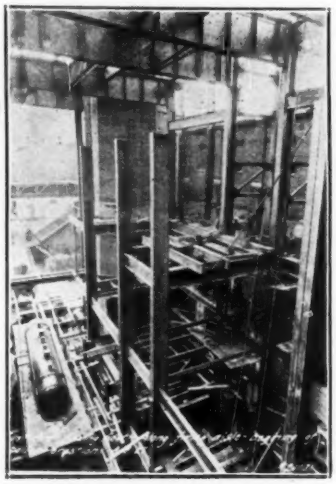
Economy Pumps

WALSH & WEIDNER

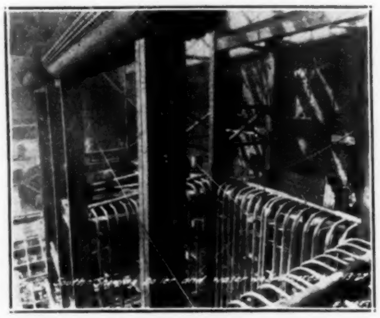
Completes the installation of two units in

RECORD TIME

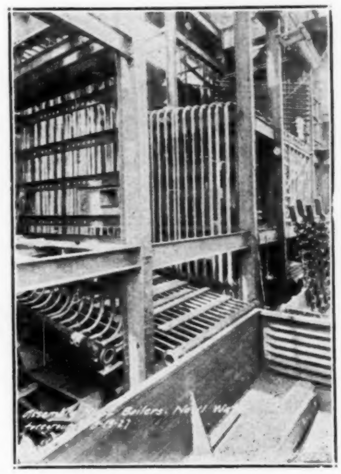
Each unit for developing 150,000 lbs. of steam per hour. Views below give progress of two 1450 H.P. 450 lb. pressure FORGED STEEL SECTIONAL HEADER WATER TUBE BOILERS during erection for The Commonwealth Power Corp., at the plant of The Nashville Railway & Light Co.



8-8-27 Beginning of erection

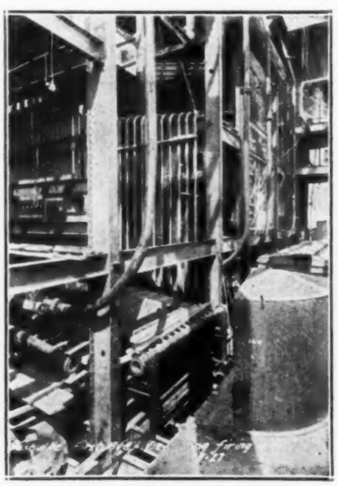


8-13-27 Drums in place

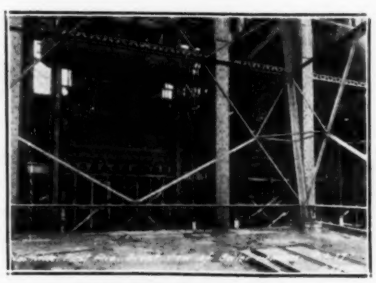


8-19-27 Sections being assembled

BE SURE TO SEE OUR EXHIBIT AT BOOTH 72



8-28-27 All sections of 1st boiler in place



9-9-27 All sections both boilers in place

10-1-27 Boilers Completed

THE WALSH & WEIDNER BOILER CO.

Chattanooga, Tenn.

Branch Offices: New York Chicago Kansas City San Francisco Greenville, S. C. Memphis Houston, Texas New Orleans Havana

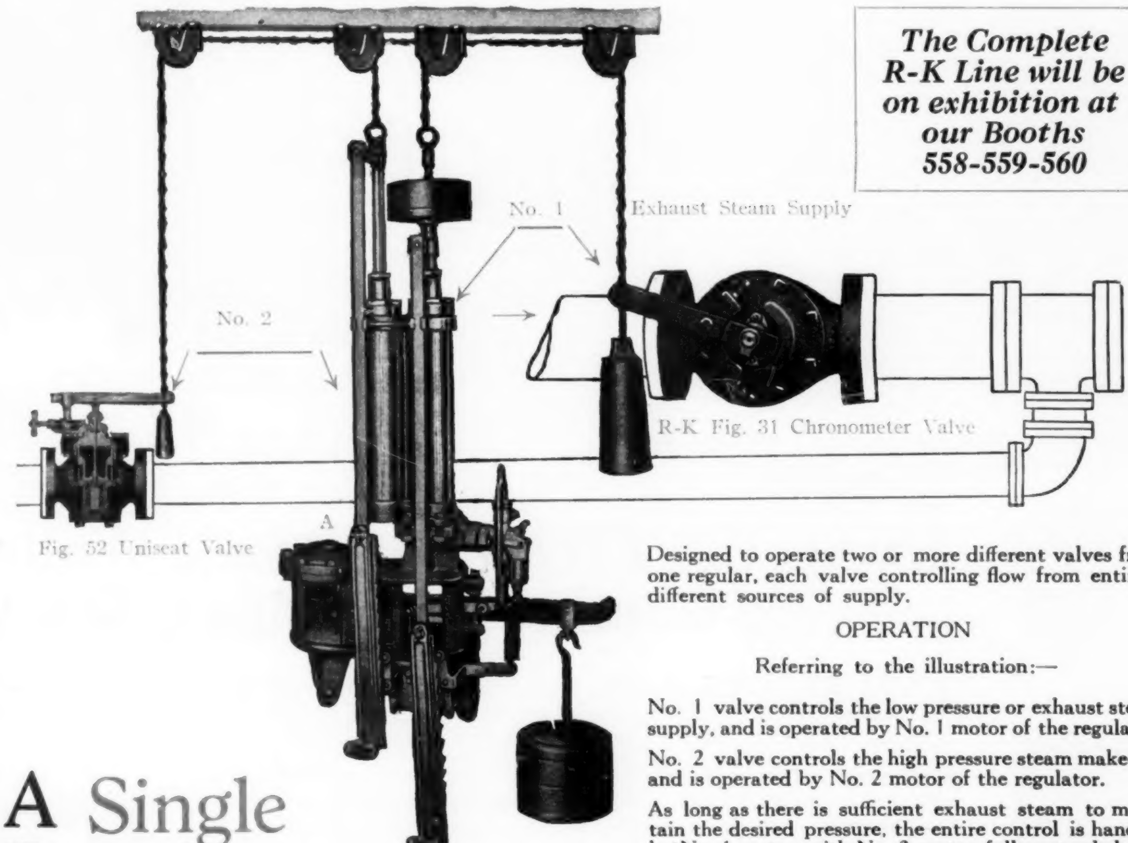
R-K

for Regulation On the Step-Action Principle

R-K TRADE MARK REG.U.S.PAT.OFFICE

Dual Motor Type Step Action Regulator

The Complete R-K Line will be on exhibition at our Booths 558-559-560



A Single Regulator With a Two-fold Purpose

Designed to operate two or more different valves from one regular, each valve controlling flow from entirely different sources of supply.

OPERATION

Referring to the illustration:—

No. 1 valve controls the low pressure or exhaust steam supply, and is operated by No. 1 motor of the regulator.

No. 2 valve controls the high pressure steam make-up, and is operated by No. 2 motor of the regulator.

As long as there is sufficient exhaust steam to maintain the desired pressure, the entire control is handled by No. 1 motor, with No. 2 motor fully extended and the live steam valve closed. If the exhaust steam supply falls off or is insufficient to meet an increased demand, the No. 2 live steam valve will open to make up the deficiency.

BOTH MOTOR PISTONS OPERATE IN STEPS

For high pressures and high temperature, the valves are made with cast steel bodies and are Monel Metal fitted.

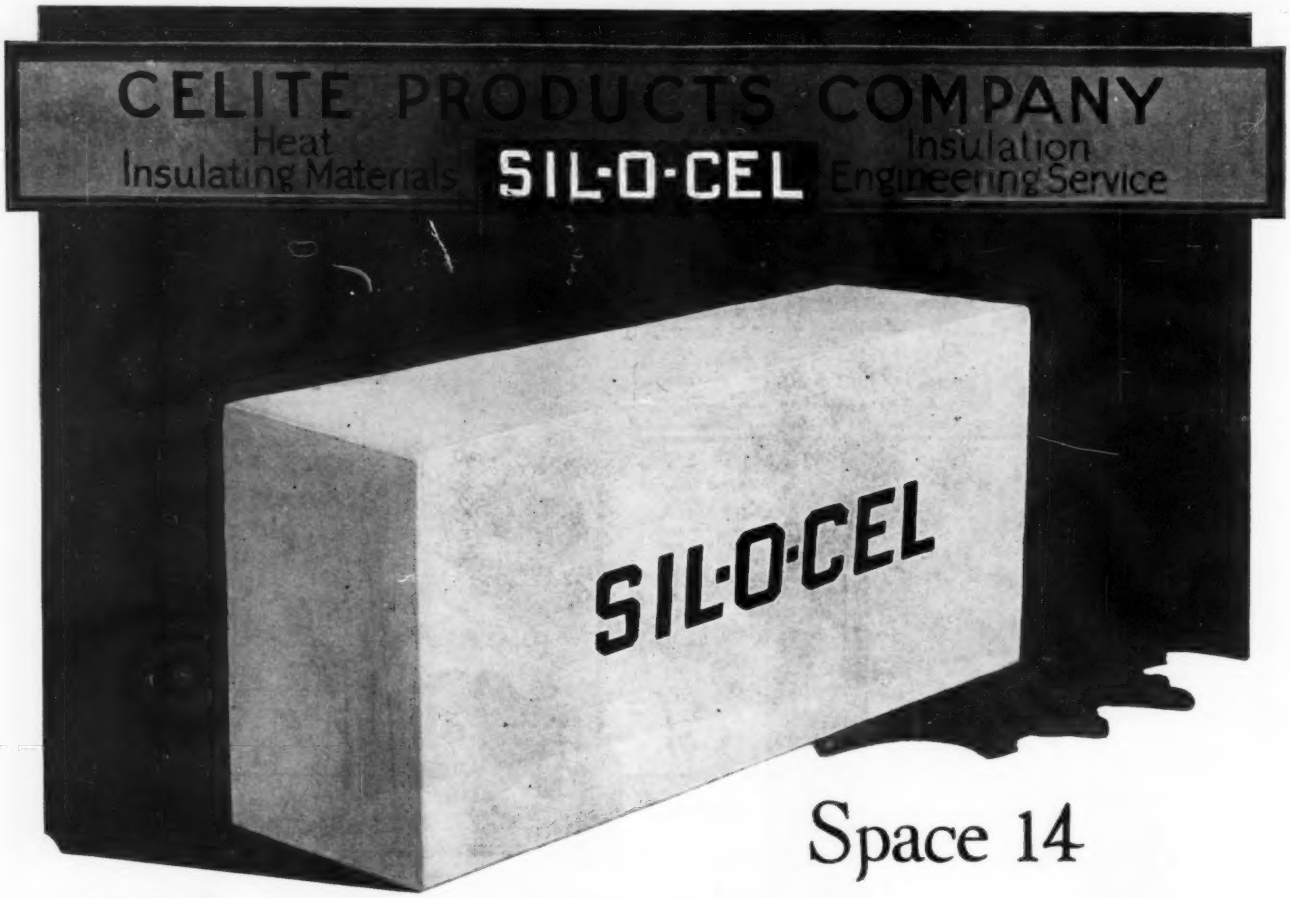
Write for Bulletin "A" and Bulletin "C-4." Our engineers will be glad to assist you in obtaining correct steam, air, water, gas or oil pressure regulation.

R-K-RUGGLES-KLINGEMANN MFG Co.

Manufacturers Complete Line Draft Control Equipment

MAIN OFFICE and WORKS
5 Foster Court, Salem, Mass.

Boston Office, Chas Chauncy Bldg
New York Office, 41 Cortlandt St.



Space 14

INSULATION for Bases, Walls, Tops, Drums, Breechings, Stacks

CALL AT SPACE 14 at the New York Power Show and see how insulation is used today in every part of a boiler system. Or write our nearest office for a copy of our 192-page data book that covers the complete topic of heat insulation.

In brick set boilers Sil-O-Cel insulating brick are installed between the fire-brick and the outer courses of red brick.

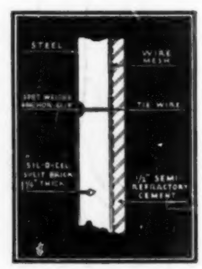
It will pay you to acquaint yourself with Sil-O-Cel Service. Sil-O-Cel engineers, who are in daily contact with insulating work of all kinds, have worked out sound methods of preventing heat waste from all types of power plant equipment.

They know which forms of insulation cost least to install in each particular type of equipment. They can accurately estimate the amount of fuel that insulated construction can save in your plant, and the effect it will have on stack draft.

Sil-O-Cel recommendations are never limited by a requirement to use any single type of insulating material. Insulating brick, block, powder, cement, and insulating concrete are employed as each individual construction dictates, to meet the most severe requirements of temperature, strength and durability.

Sil-O-Cel insulation is available in forms that withstand direct temperatures as high as 2500° Fahrenheit. Sil-O-Cel brick have crushing strengths of 28 tons per square foot and higher. Properly installed and used Sil-O-Cel insulating materials never shrink or deteriorate in insulating value.

The majority of the leading power plants built within recent years are insulated with Sil-O-Cel.



Flues, breechings and stacks are readily insulated on the inside by sticking and anchoring Sil-O-Cel 1¼" or 2½" brick direct to the steel and covering with semi-refractory cement.

CELITE PRODUCTS COMPANY

11 Broadway, NEW YORK — 225 E. Superior St., CHICAGO — 1320 S. Hope St., LOS ANGELES

Offices and Warehouses in Principal Cities

Celite Products Limited, New Birks Bldg., Montreal, Quebec
Celite Products Corporation, Windsor House, Westminster, London

Announcing
The New Ball Mill

Unit Pulverizer

1. The control of fuel to the burner is ***instantaneous.***

2. The fineness is maintained constant at all capacities or ratings.

3. Only one adjustment is required to regulate both fuel and air supply.

4. The unit is extremely rugged and simplicity itself.

5. Repairs and delays are next to nothing—this is no idle boast.

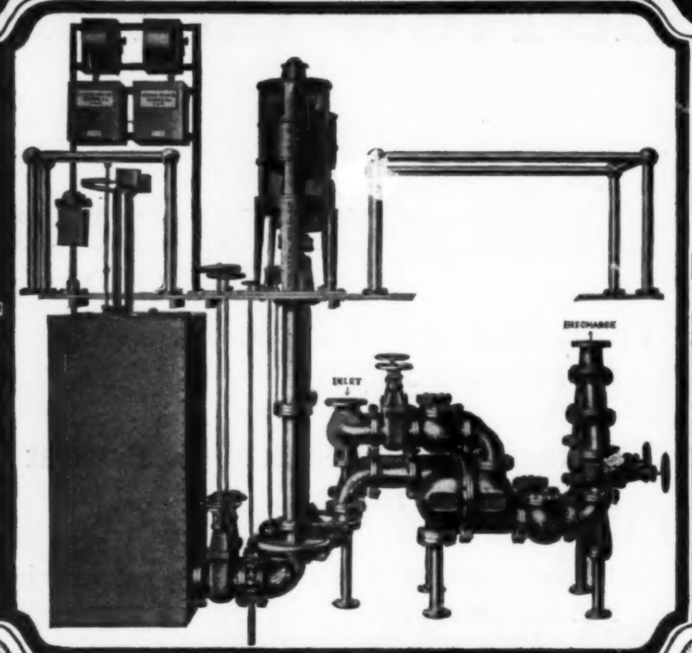
Call at Booth No. 26 at the Power Show and see a working model.

HARDINGE COMPANY
YORK, PENNSYLVANIA
WORKS AND MAIN OFFICE YORK, PENNA.
BRANCH OFFICES
NEW YORK, N.Y., 120 BROADWAY
SALT LAKE CITY UTAH: CONTINENTAL BANK BLDG.
CABLE ADDRESS "NEW YORK"

HARDINGE

Rags-Sticks-Stones

Complete Working Model



See it at the Power Show

RAGS, STICKS, STONES and other foreign materials, often clog a pump impeller — no matter how well designed. A clogged impeller will cause misalignment, wear the bearing or overload the motor.

The Chicago Pump Company's "Flush-Kleen" Sewage Ejector will handle Rags, Sticks, Stones and other foreign materials without clogging the impeller. This is an absolute guarantee.

The "Flush-Kleen" has a ***self-cleaning*** patented strainer. This device does not permit any solids or foreign materials to reach the pump impeller. They are stopped by the strainer which is cleaned by flow reversal. This method removes all sewage automatically—eliminating the disagreeable task of manual cleaning necessary in all other types.

Self-cleaning patented strainers, automatic alternators, micrometer adjustment of impeller, and other good features of the "Flush-Kleen" can be seen at the New York Power Show, Grand Central Palace, New York, Dec. 5 to 10, 1927.

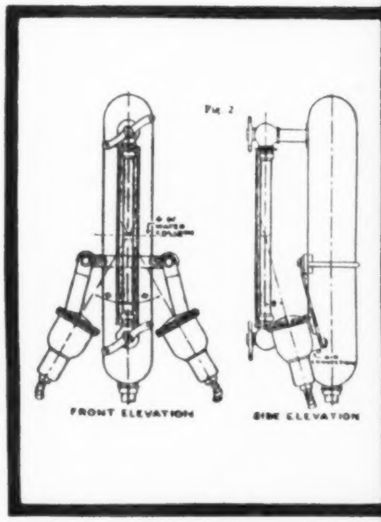
Be our guest at the Power Show. Visit Booths 636 to 639 and see the Dry Basin Type "Flush-Kleen" Sewage Ejectors in actual operation. It is an interesting exhibit.

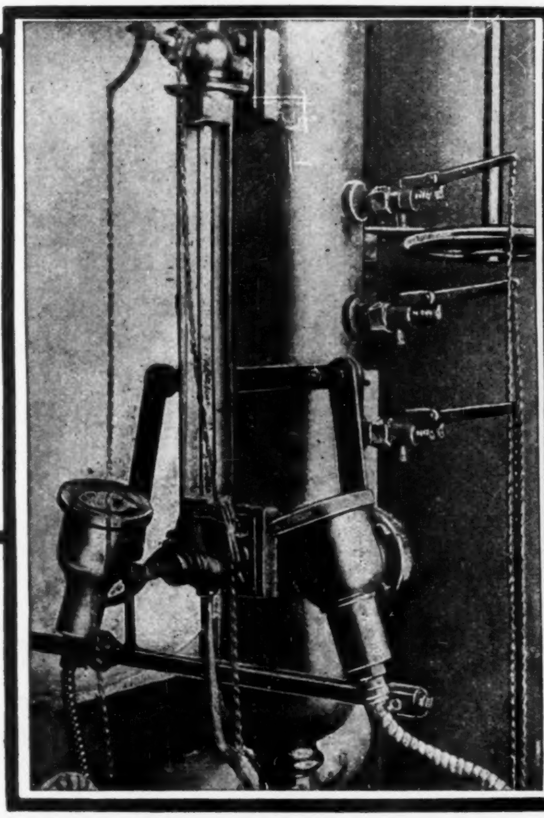
CHICAGO PUMP COMPANY

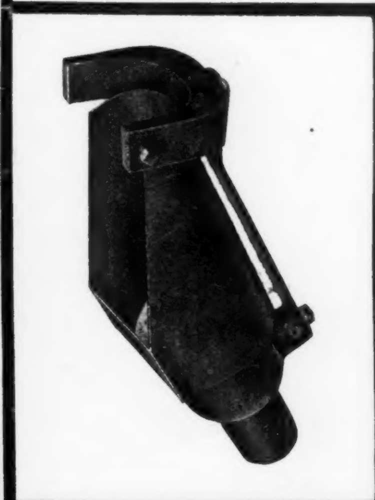
SEWAGE-CONDENSATION-CIRCULATING
BILGE-FIRE-HOUSE-VACUUM

2326 WOLFRAM ST. · · · CHICAGO, ILL.

NATIONAL ENGINEERING PRODUCTS







More than 1000 NATIONAL Water Column Illuminators are now in use, in plants including:

Wisconsin Public Service Corporation, Green Bay, Wisconsin
Connecticut Light & Power Company
The Electric Power Station of the Public Service Electric and Gas Company, Newark, N. J.
Philadelphia Electric Company.

Special Type D-NATIONAL Water Column Illuminator for High-Pressure Flat Glass-Type Water Gauges

Extreme high-pressure Boilers, of the most advanced design, use heavy flat glass Water Gauges. The new NATIONAL Type D-Illuminator fastens at the rear of the gauge, bringing out the water line as a heavy black line. *As specified for the new Edgar plant of the Boston Edison Company at Weymouth and in similar installations.*

NATIONAL WATER COLUMN ILLUMINATOR

1. Illuminates the Gauge Glass by two direct light sources.
2. The light beam is totally reflected by the meniscus at the water level.

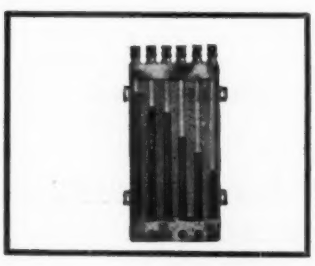
These two features make the water level clearly visible from any part of the operating aisle.

Air-jet cleaners are provided, for keeping the lenses free from dust.

Developed under actual working conditions, it maintains its efficiency at all times.

Materials and workmanship of the finest quality, to meet the severe conditions of boiler-room service.

Bracket is of aluminum, with steel yoke and arms, and aluminum lamp housings. Lenses are special heat-treated glass.



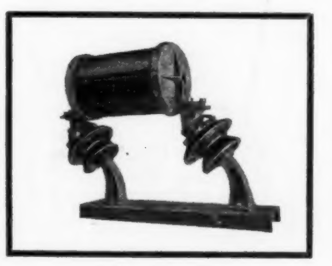
The National Philo-Multigage

The original multiple draft gauge, for indicating draft and pressure conditions and important control points within furnace, ash pit and flues. One filling takes care of all Gauges. Single reservoir, fully covered by patents. A heavy durable piece of boiler-room equipment, which saves its cost in fuel saved within a short time. *Write for special circular.*

National Reinforced Power Chokes

For Station Protection

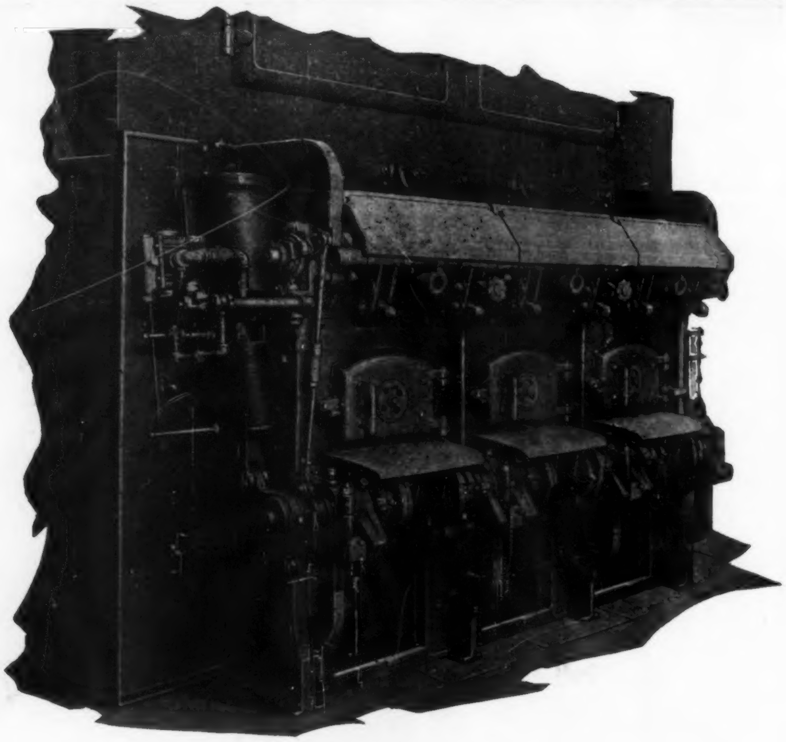
Heavily insulated concrete encased choke-coils. One choke is placed in series with each phase entering or leaving a station, to hold up sudden surges from lightning or other causes until the arrestors have relieved the lines. Made to stand up under the heavy stresses involved, and in sizes from 100-1200 amps., 15,000-110,000 volts. *Quotations gladly given on receipt of full information.*



For Sale by

M. N. Dannenbaum, 709 Bankers Mortgage Bldg., Houston, Texas.
G. W. Stetson, 141 Milk St., Boston, Mass.
W. K. Sowdon, 34 Madison Ave., N. Y. City, N. Y.
Sherman Eng. Co., 254 S. 15th St., Philadelphia, Pa.
H. W. Jarret, Rockefeller Bldg., Cleveland, Ohio.
Water Wks. Sup. Co., 208 Sharon Bldg., Detroit, Mich.
Richards-Nicklin Co., 312 Garfield Bldg., Detroit, Michigan.
C. C. Behney, 718 Empire Bldg., Pittsburgh, Pa.
Lymon C. Reed, 628 Hibernia Bldg., New Orleans, La.
D. H. Skeen & Co., 53 W. Jackson Blvd., Chicago, Illinois.
Kellogg & Farrell, 1721 L. C. Smith Bldg., Seattle, Wash.
Affiliated Eng. Co., Ltd., Southam Bldg., Montreal, Canada.
Northern Life Bldg., 615 Yonge St., Toronto.

NATIONAL CO., INC. W. A. READY Pres. MALDEN, MASS.



At the Power Show

Visit the Huber Stoker Booth
No. 46 on the Main Floor

If You Cannot Visit The Power Show

Write for this bulletin describing the advantages and operation of the Huber Automatic Stoker.

HERE you will see a full-size Huber Automatic Stoker in actual operation. Huber Engineers in attendance will be glad to explain how the Huber Stoker fulfills every requisite of proper combustion.

Ask about the efficient Huber method of drying and coking coal prior to burning. See how the volatile matter is driven off and completely consumed in the furnace. Watch the alternate movement of the Huber Stoker grate bars, keeping the fuel bed thoroughly broken up, shaking out the ash, advancing the fuel through the furnace and depositing clinkers at the rear where they are readily dropped into the ash pit.

Let Huber Engineers explain how the Huber Stoker reduces fuel costs and saves labor—and how it safeguards your plant against shutdown in the event of failure of the operating mechanism.

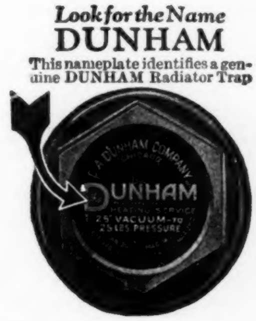
Power Show visitors, and particularly A.S.M.E. members, are welcome at Booth No. 46. Whether or not you are contemplating the purchase of Stokers, Huber Engineers will be glad to discuss your combustion problems with you.

FLYNN & EMRICH COMPANY
313 N. Holliday Street,
Baltimore, Md.

HUBER STOKERS

A Stoker for Every Boiler

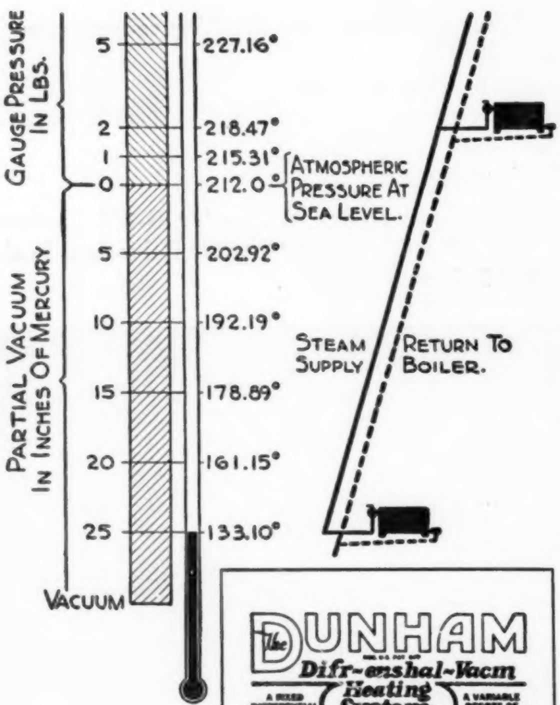
What is sub-atmospheric steam?



You are cordially invited to visit Booths 701 and 702

And see the operating unit of the

Dunham Differential Vacuum Heating System



The DUNHAM Difr-ensshal-Vacm Heating System.

Over seventy branch and local sales offices in the United States, Canada, and the United Kingdom bring Dunham Heating Service as close to you as your telephone. Consult your telephone directory for the address of our office in your city. An engineer will counsel with you on any project.

THE DUNHAM EXHIBIT
Booths 701 and 702
Power Show—Grand Central Palace

Will be in charge of the company's engineer Mr. C. A. Thinn *and a competent staff*

U. S. Patent No. 1644114
Additional patents in the United States, Canada and Foreign Countries now pending

SUB-ATMOSPHERIC steam is steam generated at pressures below atmosphere and which in a Dunham System flows to all radiators quickly and quietly at a rate and temperature which assures comfort, irrespective of changing weather out of doors.

Sub-atmospheric steam is supplied at temperatures as low as the water temperature in a hot water heating system, or at the temperature of vapor heating (depending on requirements of mild or severe weather). The diagram reproduced here illustrates the reduction in temperature as the pressure is reduced.

At atmospheric pressure water boils at 212°, whereas the Dunham Differential Vacuum Heating System circulates steam as low as 133°. This corresponds to 25 inches of vacuum by the gauge. The sub-atmospheric pressure being carried on the system is shown on the vacuum side of gauge on the boiler.

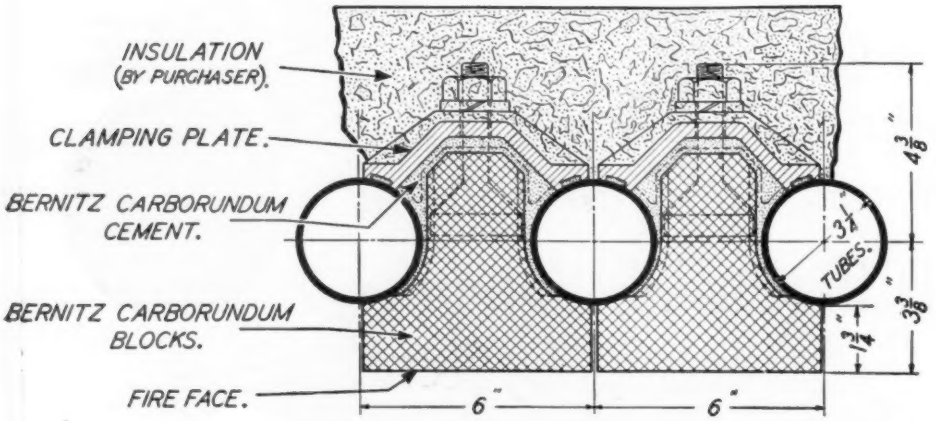
This system is without a peer in its flexibility of control and in the ability of the radiators to operate efficiently under these wide variations in sub-atmospheric steam pressures and steam temperatures. Fuel waste caused by overheating in the mild weather which constitutes 95% of the heating season is eliminated by regulating the heat emission of the radiators in the Dunham Differential Vacuum Heating System so as to balance the heat loss of the building and thus maintain a desired building temperature regardless of out-door temperature.

Steam is circulated in the radiators and piping during the greater part of the heating season under a high vacuum. During zero or severe weather the sub-atmospheric pressure is carried at different values, being modified to increase the temperature of the steam in direct relation to the heat demand, in accordance with outside temperature and wind effect.

C. A. DUNHAM CO.

DUNHAM BUILDING
450 East Ohio Street, Chicago

A First Showing



of a typical water tube wall covered with **Bernitz Carborundum Water Wall Blocks** (*Thayer Type —Patents applied for*) will be at our *Booth No. 78, New York Power Show.*

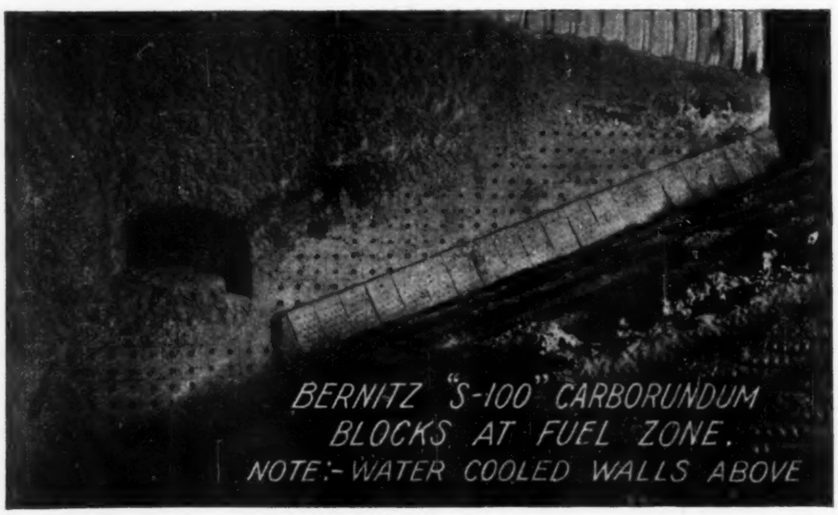
When wat[illegible]s are encased on the fire side by these **Bernitz Blocks** the resulting construction
(1) Suppo[illegible] combustion right up to the face of the wall.
(2) Materially aids to maintain high furnace temperatures at all ratings.
(3) Resists flame and mechanical abrasion.
(4) Diffuses radiant heat to large tube area.
Our Bulletin B 7, describing this type of construction is ready.

In addition to this new development we shall exhibit a side wall layout of **Bernitz S-100 Carborundum Ventilated Blocks,** as used in stoker fired furnaces, a **Bernitz** Ventilated Floor for Pulverized Fuel and Oil Burning Furnaces, and other standard **Bernitz** Air-Cooled Refractory Shapes.

There is a Bernitz Lining for every furnace requirement.

To the right is shown **Bernitz S-100 Carborundum Blocks** with water cooled walls above, a combination which has given exceptionally good satisfaction and service. The photo was taken after 18 months' usage.

Bulletin B 34, describing these blocks and showing many typical furnace layouts, is also now ready.



BERNITZ FURNACE APPLIANCE COMPANY

MAIN OFFICE:
80 Federal Street
Boston, Mass.

LONG LIFE
TRADE BERNITZ METHOD MARK

DISTRICT OFFICES:
350 Madison Avenue, New York City
Bellevue Court Bldg., Philadelphia
Book Building, Detroit
Pure Oil Bldg., Chicago

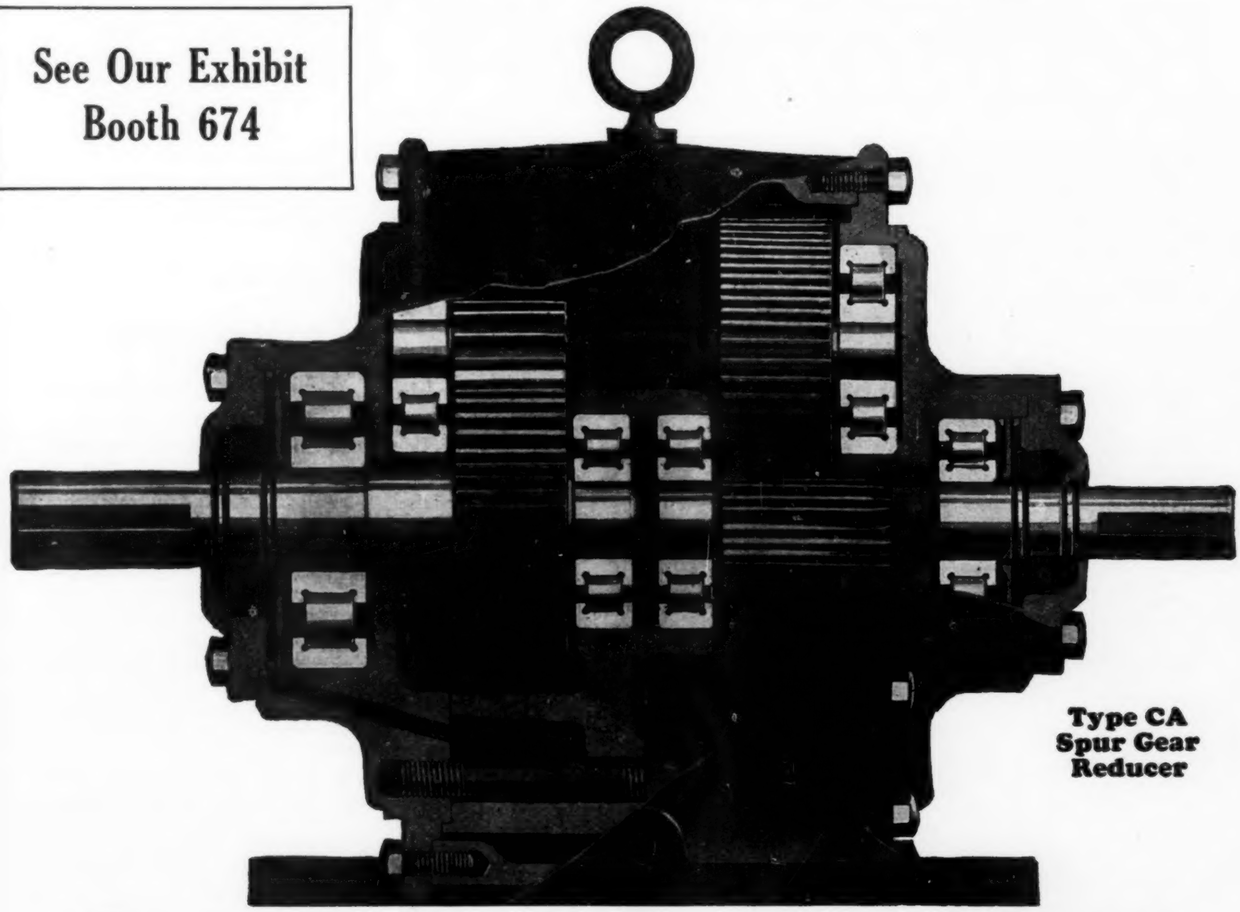
Pittsburgh Cleveland Atlanta New Orleans Kansas City Salt Lake City San Francisco

Bernitz Carborundum Super Blocks are Manufactured exclusively for us by THE CARBORUNDUM CO. of PERTH AMBOY, N. J.

AD SPEED REDUCERS

with Full Anti-Friction Bearings

See Our Exhibit
Booth 674



Type CA
Spur Gear
Reducer

Get the Speeds You Want with Least Power Loss!

***Because*—1** — Full Anti-Friction Bearings
2 — Our famous "Zones of Quiet" accurately-cut Gears
3 — All shafts supported at both ends, hold gear teeth always parallel.

Also 5 other Outstanding Advantages

—The unusually compact design conserves space
—The superior rigidity of these Reducers insures least vibration
—The dust-proof and oil-proof construction insures long service
—The exceptional accessibility saves time
—Maximum possible efficiency

Write us about your Speed Reducing Problems.

AD SPEED REDUCERS

Made in Worm Gear *and* Spur Gear Types

ALBAUGH-DOVER MFG. CO., 2228 Marshall Blvd., Chicago, Ill.

We supply Gears of all kinds—Spur, Bevel, Helical, Worm, Internal, Bakelite and Raw Hide Pinion. Send us your sketches, blue prints or specifications for estimates.

Economies—

In Power Cost—
Investment—
Floor Space—
Maintenance

The combined efficiency of the high speed motor and texrope drive is in excess of a lower speed direct connected drive, and power factor is improved 17%.

The *cost* of the 1730 RPM Motor and texrope drive complete is less than a 575 RPM direct connected motor and coupling.

Floor space is less because of the smaller motor—the compactness of the texrope drive—the efficient location of the machines in relation to each other.

Maintenance is reduced to a minimum. Grease packed Roller Bearings require attention only a few times yearly. Allis-Chalmers electric furnace steel frames, indestructible rotors, extra-sealed insulation and other characteristic superiorities contribute to permanent endurance and economy.

The Texrope Drive is 98.9% efficient. It is positive and silent. Dust does not affect it. No lubrication is required.

ALLIS-CHALMERS MFG. CO.
MILWAUKEE
District Sales Offices in all Principal Cities.

15 H.P. 1730 RPM. Allis-Chalmers Roller Bearing Motor driving 575 RPM. Band Resaw through Texrope Drive.

ALLIS-CHALMERS MOTORS *and* TEXROPE DRIVE

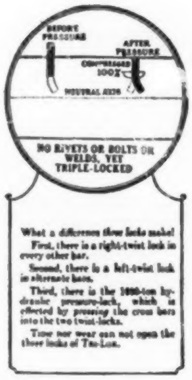
TRI-LOK

PAT'D.

"KING OF THE WALK"

TRADE MARK REG.

for Power Plant Flooring



A light, strong structure which will carry a maximum load with a minimum of dead load on the supports—safe and non-slipping.

Tri-Lok is 90% open, there are no acute angles to collect dirt and dust. It admits more light to floor beneath—ventilates completely—ideal for the power plant.

Can be furnished galvanized or painted and is easy to repaint.

These are just a few of the advantages of Tri-Lok. We will be pleased to go into details. Write for interview.

You will be interested to visit our exhibit in Booths 401 and 402 New York Power Show

The Tri-Lok Company

5547 BUTLER STREET, PITTSBURGH, PENNA.

A.S.M.E. Annual Meeting Program

New York, December 5 to 8, 1927

Monday, Dec. 5

Morning: 9:30 A.M.
Council Meeting.
Conference of Local Sections Delegates.

Afternoon: 2:30 P.M.
Council Meeting.
Conference of Local Sections Delegates.

Evening: 8:00 P.M.
Open House.

Tuesday Morning, December 6, 9:30 A.M.

Machine Shop Practice (I)
Symposium on Hydraulic Feeds for Machine Tools:
Characteristics of Hydraulic Feed and Drive for Cutting Tools, WALTER FERRIS.
Hydraulics and Modern Machine-Tool Design, WALDO J. GUILD.
The Development of Hydraulic Feeds on Multiple Drilling Machines, R. M. GALLOWAY.
Hydraulic Feeding Mechanism for Milling Machines, S. EINSTEIN and H. ERNST.

Industrial Power
The Ruths Steam Accumulator, R. A. LANGWORTHY.
Stresses and Reactions in Expansion Pipe Bends, A. M. WAHL.

General (I)
The Steel-Wool Industry, CROSBY FIELD.
The Modern Fire Engine, KARL W. STINSON.

Railroad (I)
Vibration of Bridges, S. TIMOSHENKO (by title).
The Motor Truck and L. C. L. Freight, F. J. SCARR.
Back Pressure and Cut-Off Adjustment for the Locomotive, THOS C. McBRIDE.

Tuesday Afternoon, December 6, 2:00 P.M.

Machine Shop Practice (II)
Symposium on Plant and Equipment Maintenance:
Maintenance of Machine Equipment, WILLIAM HARTMAN.
Plant Maintenance and Return on Capital Investment, W. H. CHAPMAN.
Maintenance of Shop Equipment, J. R. WEAVER.
Maintenance of Shop Equipment, C. S. GOTWALS.
Plant Maintenance, GEO. H. ASHMAN.

Railroad (II)
Heating and Ventilating of Passenger Cars, EDWARD A. RUSSELL.
Can Accident Prevention Be Reduced to a Science? THOS. H. CARROW.

Joint Session with A.S.R.E.
Heat Transfer, General Formulas, EDWIN R. COX (contributed by A.S.M.E.).
How Shall We Measure Heat Flow of Compound Walls? F. G. HECHLER (contributed by A.S.R.E.).
Effect of Pipe Lengths on Orifice Coefficients, A. J. WOOD (contributed by A.S.R.E.).

Hydraulic
Symposium on Centrifugal Pumps:
Centrifugal Pumps, HERBERT T. DAVEY.
New Method of Separating the Hydraulic Losses in a Centrifugal Pump, MICHAEL D. AISENSTEIN.
Method of Analyzing Performance Curves of Centrifugal Pumps, JOS. LICHTENSTEIN.

Lecture 4:30 P.M.
Address by W. E. WICKENDEN on What the National Engineering Societies Can Do for Engineering Education.

Tuesday Evening, December 6, 8:30 P.M.

Presidential Address and Reception; Award of Melville Medal to L. P. ALFORD.

Wednesday Morning, December 7, 9:30 A.M.

Fuels
The K.S.G. Process of Low-Temperature Carbonization, WALTER RUNGE.
Progress Report, R. T. HASLAM.

Machine Shop Practice (III)
The Development of Machine Tools from a User's Viewpoint, F. C. SPENCER.

Materials Handling
Materials Handling as an Aid to Production, FRANK L. EIDMANN.
Costs of Operation and Savings Effected by Electric Industrial Trucks and Tractors, C. B. CROCKETT and H. J. PAYNE.

Photography
(Joint Session with American Optical Society.)
Present Applications of Photography in Mechanical Engineering, C. E. K. MEES.
Photomicrography and Its Application to Mechanical Engineering, F. F. LUCAS.
X-Ray Photography and Its Application to Mechanical Engineering, W. P. DAVEY.

Wednesday Afternoon, December 7

2:00 P.M.
Business Meeting.

3:00 P.M.
Education and Training for the Industries
Apprentice Training for Draftsmen, C. J. FREUND.
Principles of Apprenticeship Organization, BEN S. MOFFATT.

3:00 P.M.
Student Branch Conference

3:00 P.M.
Steam Tables Research.
Reports from Bureau of Standards and M.I.T.

3:30 P.M.
Ladies' Tea.

Wednesday Evening, December 7, 6:30 P.M.

Annual Dinner.

Thursday Morning, December 8, 9:30 A.M.

Management (I)—Jointly with A.M.A.
Control of Factory Overhead, H. G. PERKINS.
Production Control in a Wrought Brass Mill, W. R. CLARK and ARTHUR BREWER.

Central-Station Power
Short-Time Tensile and Expansion Tests on Plain Carbon Steels and Enduro Metal at Elevated Temperatures, A. E. WHITE and C. L. CLARK (by title).
Some Factors in Furnace Design for High Capacity, E. G. BAILEY.
Some Operating Data of Large Steam-Generating Units, HENRY KREISINGER and T. E. PURCELL.

Aeronautics
The Effect of High Temperature on the Materials Used in Aircraft, J. B. JOHNSON (by title).
Oleo Gears for Aircraft, E. E. ALDRIN.
The New Propeller-Type High-Speed Windmill for Electric Generation, E. N. FALES.

General (II)
Analysis of Strains and Stresses in a Wristpin of an Automobile Engine by the Mathematical Theory of Elasticity, G. B. COLLIER (by title).
Nozzles with Rounded Approach for Measuring Flow of Air and Gas, S. A. MOSS.
Destruction Test of a 66-Inch Forged Steel Penstock Pipe, JOHN L. COX.

Thursday Afternoon, December 8, 2:00 P.M.

Management (II)—Jointly with A.M.A.
Budgetary Control, Papers by J. P. JORDAN and H. V. COES.

Research
Symposium on Lubrication:
Viscosity of Lubricants Under Pressure, M. D. HERSEY and H. SHORE.
The Effect of Running In on Journal-Bearing Performance, S. A. McKEE.
An Investigation of the Performance of Waste-Packed Armature Bearings, G. B. KARELITZ.

Boiler Feedwater (Joint Research Committee on Boiler Feedwater Studies and Power Division)
Progress Report of Executive Committee, with Outline of Plan and Scope for Future Work, S. T. POWELL.
Progress Reports of Sub-Committees of Joint Research Committee on Boiler Feedwater Studies.
Design and Operation of Deconcentrators and Continuous Blow-Down Apparatus, R. C. BARDWELL (Sub-Committee No. 1).
Water Softening by Chemicals, with Special Reference to Combined Systems, C. R. KNOWLES (Sub-Committee No. 2).
Studies on Priming and Foaming of Boiler Waters, with Special Reference to Railroad Practice, C. W. FOULK (Sub-Committee No. 3).
Corrosion of Boilers and Appurtenances, and Plan and Scope of Future Work, F. N. SPELLER (Sub-Committee No. 5).
The Effect of Industrial Wastes on Boiler-Feedwater Problems and Condenser Operation, V. B. SIEMS (Sub-Committee No. 7).
Standardization of Water Analyses, with Recommendations for the Determination of Dissolved Oxygen, CO_2, and Hydrogen-Ion Concentration, HAROLD FARMER (Sub-Committee No. 8).
Bibliography of Boiler Feedwater, with a Review of the Work During the Past Year, GEORGE A. STETSON (Sub-Committee No. 9).

Oil and Gas Power
Parallel Operation Between Alternating-Current Generators, J. W. MORTON and C. JUUL (by title).
Efficiencies of Otto and Diesel Engines, F. O. ELLENWOOD, F. C. EVANS and C. T. CHWANG.
Diesel Locomotives, R. HILDEBRAND.

Henry Robinson Towne Lecture, 4:30 P.M.
The Relationship Between Industry and Taxation—An Economist's Views of a Sound Program for American Business in the Field of Taxation, Prof. T. S. ADAMS.

ALPHABETICAL LIST of ADVERTISERS in this section

See Pages 9-33 for Directory of Exhibitors and Pages 35-41 for Floor Diagrams

BARCO

FLEXIBLE JOINTS and LUBRICATED, BALANCED PLUG VALVES

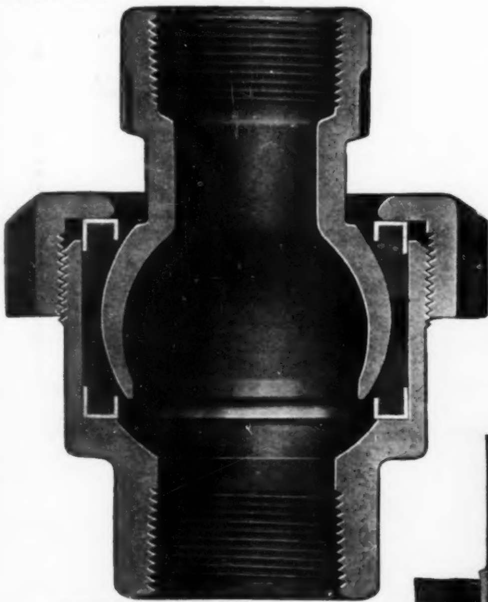
BARCO JOINTS

are made in sizes from ¼" to 3" inclusive of malleable iron: from ¼" to 2" inclusive, of bronze; from 4" to 48" inclusive of cast iron.

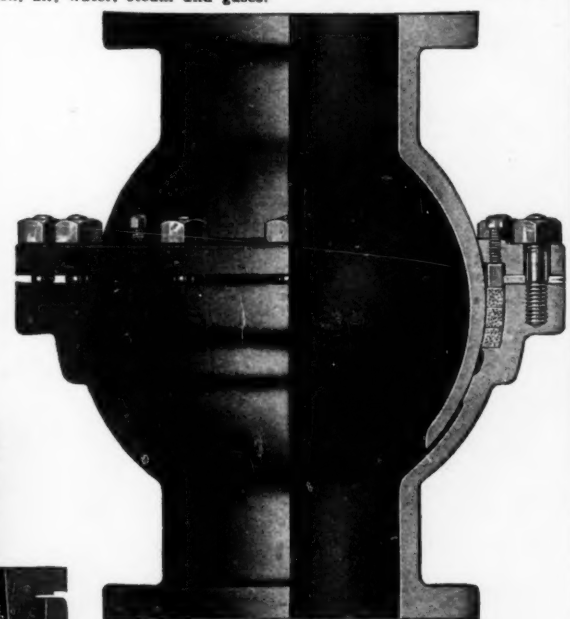
Barco standard joints are recommended for 150-lb. steam pressure, up to and including the 3" size, whether made of bronze or malleable iron. Above 3" the standard cast iron joints are made for 125-lb. water pressure.

BARCO JOINTS

are furnished with flanged ends, faced and drilled, in sizes from 4" to 48", inclusive. These joints are used on sand suckers, dredges, water works piping, hydraulic lines, and generally, in order to relieve pipe strains caused by changes in temperatures, shifting of anchorages, etc., and to provide flexibility. They are equally tight under suction or pressure, and are suitable for all liquids, including oil, air, water, steam and gases.

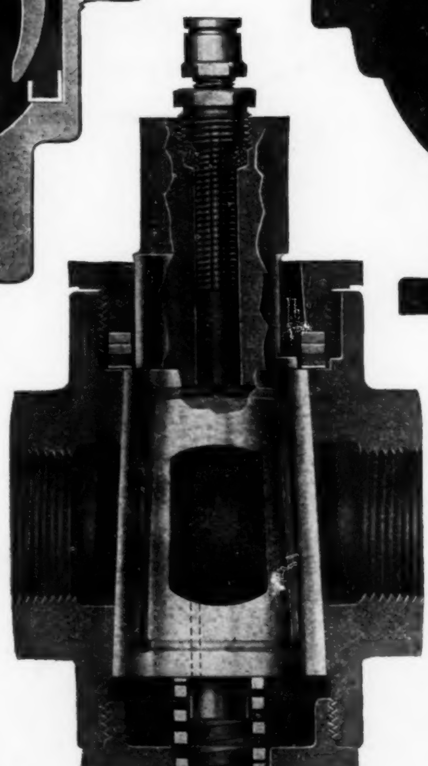


SCREW ENDS—¼" to 6"



FLANGE ENDS—4 to 48 inches

Barco joints of all sizes can be made of special materials for special purposes such as to resist acids. They are also made extra heavy for high pressures.



MARTIN PATENT

BARCO VALVES

THE Barco Lubricated Plug Valve is designed with the taper pointing toward the gland so that the plug cannot blow out of the body if the gland is removed. This valve is pressure seated and does not depend on springs or auxiliary devices to keep the valve seated. A one quarter turn of the handle opens the valve fully providing a straight full area passage.

The Barco Lubricated Plug Valve is provided with a convenient method of lubrication which feeds the lubricant to the wearing surfaces only so that very little lubricant is required. A hand lubricator is furnished

BARCO VALVES

except where a large number of valves are used at one point when the gun type lubricator with a lubricating gun is found more convenient and economical.

Barco Lubricated Plug Valves are furnished for all pressures and vacuums and for the highest temperatures and are made of materials best suited for the service in which they are to be used.

Engineers who figure the flow of liquid and gases in their pipe lines with great care are glad to find that these figures are not upset by being obliged to force the liquid or gas through obstructed passages where the direction of flow is changed.

These valves are furnished with standard one way handles, cross handles or with geared handles when required.

Special acid resisting valves have proven very satisfactory and inquiries are solicited from those interested.

BARCO MANUFACTURING COMPANY

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THE HOLDEN COMPANY LIMITED
IN CANADA
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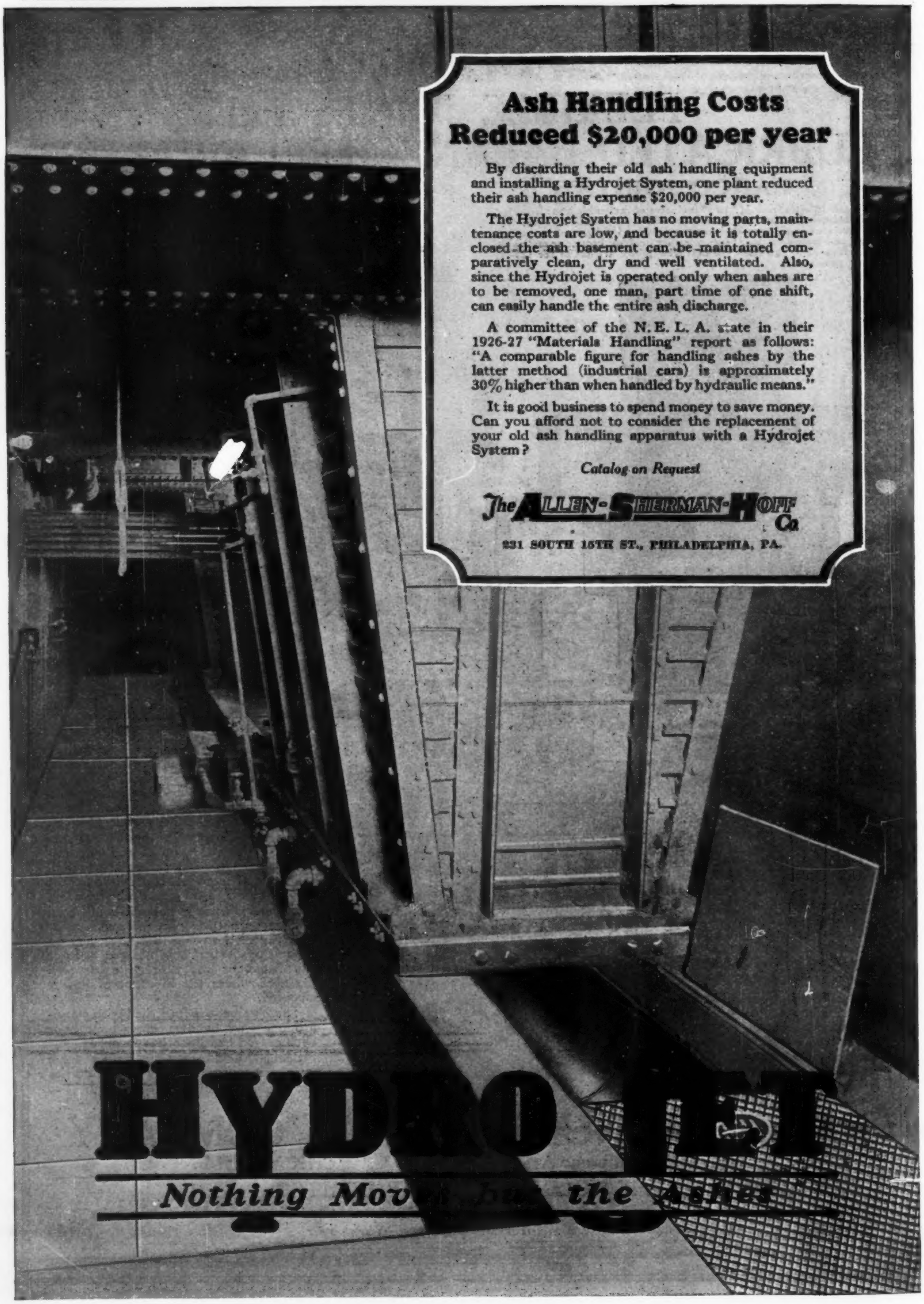
(See Our Data in 1927-28 A.S.M.E. Condensed Catalogues of Mechanical Equipment)


Ash Handling Costs
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By discarding their old ash handling equipment and installing a Hydrojet System, one plant reduced their ash handling expense $20,000 per year.
The Hydrojet System has no moving parts, maintenance costs are low, and because it is totally enclosed the ash basement can be maintained comparatively clean, dry and well ventilated. Also, since the Hydrojet is operated only when ashes are to be removed, one man, part time of one shift, can easily handle the entire ash discharge.
A committee of the N. E. L. A. state in their 1926-27 "Materials Handling" report as follows: "A comparable figure for handling ashes by the latter method (industrial cars) is approximately 30% higher than when handled by hydraulic means."
It is good business to spend money to save money. Can you afford not to consider the replacement of your old ash handling apparatus with a Hydrojet System?
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